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The book cover features a prominent circular seal of the State of Iowa at the top center. The seal depicts a central figure, likely a Native American, holding a bow and arrow, with a star above his shoulder. The figure is surrounded by a landscape of rolling hills and a river. The words "THE GREAT SEAL OF THE STATE OF IOWA" are inscribed around the perimeter of the seal, and the date "1846" is visible at the bottom.

IOWA STATE GEOGRAPHY



AITCHISON

UNIVERSITY OF CALIFORNIA
AT LOS ANGELES



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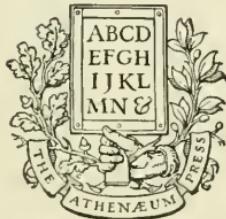
THE ALLISON MONUMENT ON THE CAPITOL GROUNDS AT
DES MOINES

IOWA STATE GEOGRAPHY

BY

ALISON E. AITCHISON

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• *Handbook of the Civil
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PREFACE

A clear conception of the plan and purpose of this book will save worry and unnecessary work on the part of both the pupils and the teacher.

It has been customary to follow the regular textbooks in geography with a brief state supplement made up of salient unrelated facts—a sort of compendium of information for the pupil who had completed his regular course in geography. This book is in no sense a supplement. On the contrary, it is designed to be used as a separate text in the intermediate grades. Due allowance being made for local variations in the course of study, it is now generally conceded that this sort of state study should precede the study of the Central Plains, of which Iowa is a part, and the sectional study of the United States. This text therefore begins with the home region and may be followed by closely related larger units. It is taken for granted that the pupil knows how to read the globe and the map of North America; that he can follow meridians and parallels and can understand the indications of highlands and lowlands on the map. Necessary maps for reference are included, but it is the aim in this study to give the child usable knowledge of his immediate environment and to develop his ability to interpret properly as many usable related facts as can be presented.

Teachers have complained that it is difficult to find proper usable material. Much that is available has been written for adults and is beyond the ability of the child to understand. It is the purpose of this book, therefore, to furnish proper material.

Children like a wealth of detail, and they must have it if they are to acquire adequate mental pictures. If it is not supplied either by the text or by the teacher, little wonder that to the pupil cities become merely black dots and rivers wriggly black lines. To illustrate: in the discussion of the Mississippi River

an effort has been made to approach the subject from different angles and to give many varied yet closely related facts, with their consequent historic results, so that the children will really come to know the beautiful stream on whose waters our commerce has been carried and on whose banks our history has been made.

This book is not an experiment. The success of the plans and material has already been demonstrated in many Iowa schools.

This book has been written in accordance with modern methods of geography teaching. Much use has been made of the problem and the picture. The problems are very simple and easily solved, as they should be for children of these grades. Their solution involves the use of the text, the pictures, the maps, and the knowledge which the pupils have gained through their everyday experiences. The pictures in the text have been selected for well-defined purposes and are accompanied by explanations and questions. They are intended for use in teaching, not simply for decoration.

The statistics which are incorporated in the text are not to be memorized, but are to be used in making comparisons and reaching conclusions. Similarly, the Facts and Figures section at the close of the book is included not for teaching purposes (in the ordinary sense) but for reference.

It is hoped that this geography of Iowa may give those who use it a deeper appreciation of and a greater love for the state, its beauties, and its possibilities.

ALISON E. AITCHISON

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SUGGESTIONS TO TEACHERS

Doubtless many questions will arise in the mind of the teacher who uses this text for the first time. Three immediately suggest themselves to the author:

First, in the Preface it was urged that the pupils be well grounded in the use of the map. How can this be accomplished most efficiently? most effectively?

Second, does the text contain more material than can be used in the time which is usually allotted to the study of Iowa geography?

Third, can the problem method be used successfully in connection with the material here given?

The following method of teaching the globe and map has been used throughout the state, with many intermediate classes in geography, and teachers have found it satisfactory.

I. Reading the globe—before any map work is done.

- (a) *Find on the globe the continents and oceans.* Teach first those with which the child is already familiar through his study of peoples.
- (b) *Directions.*
 - (1) *North and south.* Find the north pole. When going toward the north pole you are going north, when going toward the south pole you are going south. Use meridians as guides as naturally as you would streets.
 - (2) *East and west.* Keep the globe always with the north pole pointing toward the North Star. The earth turns from west to east. Use a candle or electric light to show that this causes the sun to rise in the east. Use parallels in traveling east and west.
 - (3) *Up and down.* Throw a ball up in the room. Move your hand away from the surface of the

globe. You are moving it up. Move it toward the surface. You are moving it down. Down is toward the center of the earth. Come to the globe. Play you are a boy in Australia and throw a ball up into the air.

II. Reading the map. Use the physical map of North America or any map of North America which shows meridians and parallels clearly. Let each child use his own map, placing his book flat on the desk, with the north pole toward the north if possible.

- (a) *Find the north pole on the map.* Work out a number of such exercises as these: Place your finger on Cape Farewell in Greenland and move straight north. Place one finger on Point Barrow in Alaska and put another finger straight south of it. Do not teach that the bottom of the map is south. It is not the only south. Hundreds of children are being taught this and are hampered in their map-reading forever because of this teaching. In any school system you can find a score of children who will tell you that Greenland is southeast of the north pole. Teach east and west simply by transferring the direction lines already learned on the globe.
- (b) *Surface.* This will have to be taught from a physical map. The newer geographies have these in abundance. Teach how to use the color keys in studying the heights of land.
- (c) *Drainage.* Teach the direction of river flow. Trace a few river basins.

Fourth, the general textbook in geography must make its contact through the home state. An effort has been made here to show the individuality of this state. It differs in some ways from the other forty-seven. Human geography is the study of the relation of geographic environment to human activities. We are trying to make the children realize that there are reasons why the people of Iowa live as they do; that our work and our wealth are the results of our physical environment.

Many of the facts and figures given are not intended to be remembered; they are to be used simply in helping the child to reason out why certain things have come to be. It is intended

that the child shall do a good deal of reading in the text for each lesson, rather than that he shall be given an assignment of a few pages and told to commit it to memory, as is frequently done. Children of this age are interested in how people live and what they do. They do not want nor do they need scattering, unrelated facts about locations of cities and the names of county seats, a sentence here and a sentence there. They need enough of related, worth-while details to enable them to build some accurate mental picture or reach some conclusion. You might, for example, expect to find a chapter on climate, but there is no excuse for introducing that subject here except as it affects the crops we raise, the type of house we build, the food we eat, or something else that actually affects the child. If you will notice, the subject of climate is brought up time and time again, but always with reference to some of its effects—the erosion of rock, the homes of the pioneers, the question of road-making—thus making its effects the key to its study. If you find that there is too much material, omit the part which least concerns the group of children with which you are working. While we do not wish to assign work which is to be unthinkingly memorized, on the other hand we must make sure that the child carries away with him something definite.

Fifth, the problem method can be used in the teaching of this Iowa geography. Much of the material has been arranged with this in view. Not every lesson, however, is adapted to that method of teaching. Why try to use it everywhere? When a problem will enable you to teach a set of geographic principles better than some other method will, then use a problem and find pleasure and interest and profit both for yourself and your pupils. A problem may be made worse drudgery than any drill if used simply because someone thinks you ought to teach by that method.

There are two things to be considered in assigning a lesson in this way: first, the problem should be something which appeals to the present interest of the child, directs him in his search for material, and gives him a basis for selecting and

rejecting facts; second, it must enable the teacher to teach the facts which she thinks ought to be taught concerning any region or industry, and the principles which underlie those facts. The text introduces dozens of possible problems. They are not labeled. To do so would rob them of their value. If they do not appeal to you individually as usable in your classes, then take some other problem or some other means of approach. The material for the solution of most of these problems is in the text, so that the children may solve them. In the back of the book you will find material for many more local problems if you have time for them. Thus, the study of the cement industry, which might be made by a class in Mason City, would be very different from that which might be made by a class in another locality. References to the map have been made constantly. This is the simplest way to teach location. Every possible effort has been made to relate this to the everyday life of the child and to utilize facts he already knows.

It is the hope of the author that this text will make the study of Iowa geography enjoyable and profitable both to teacher and pupils and lead them away from the mere memorizing of facts of little value.

IOWA STATE GEOGRAPHY

CHAPTER I

GETTING ACQUAINTED WITH OURSELVES

WHY DO WE WISH TO STUDY IOWA?

We are planning to spend some time studying Iowa. What do we want to learn about our own state? Less than one hundred years ago there were no white men living in Iowa. The only inhabitants were Indians. Today we have over two and a third millions of white people. Then there were no roads except a few Indian trails, no railroads, no houses except Indian wigwams, no cultivated fields except a few patches of corn, no poultry, no cattle, no towns, no factories, no schools, no churches. In less than one hundred years all these have come to Iowa.

Long ago in the early history of this section of the country, before Iowa had become a state and while the Indians still owned the land here, a great many white men were so anxious to come across the Mississippi River into this region that the United States government had to keep a force of soldiers at the place where Dubuque now stands, to prevent them from coming in and thus breaking our treaty with the Indians. We are told that a few years later, when white men were permitted to come into the territory to settle, the hills across the river opposite the spot where Burlington now stands used to blaze at night with the camp fires of the immigrants. They were waiting to be ferried across the Mississippi to begin their long journey across our prairies, where they hoped to make new homes (Fig. 1).

Can you mention some of the things which in those early days might have attracted settlers to Iowa?

We still have most of those attractions and a great many others. Some people say that the Indian word *Iowa* means "this is the land." We believe that this is the land for us. If we are to live here we wish to earn the very best living which the state is able to afford us and to enjoy everything which the state has to offer us. We want to learn what we can do to make Iowa a better place to live in and how we can leave it in the best possible condition for those who come after us.



FIG. 1. This wagon bridge across the Mississippi at Burlington is near the place where so many of the early settlers were ferried across the river

We shall therefore need to know many things about our soil and climate. Since we have beautiful scenery we want to know where to find it when we have opportunities to make trips about the state. We must learn to find the answers to such questions as this: What are some of the reasons why Iowa, with an area of fifty-six thousand one hundred and forty-seven square miles, has more than two and a third million people, while New Mexico, which is more than twice as large, has not even half a million inhabitants?

If you had a friend outside of Iowa who wished to move to a new home, could you write him a letter showing Iowa to be so attractive that he would want to move here? When we have finished studying the book you shall try.

IS OUR LOCATION A GOOD ONE?

As we study about Iowa we shall often refer to the other parts of the United States; we shall therefore first find out just how we are located in our country and judge whether or not our position is a good one.

Turn to the map of the United States (p. 4). Notice what states and rivers bound Iowa. Using the scale of miles given on this map, find out how many miles it is from the capital of Iowa due east to the Atlantic Ocean; due south to the Gulf of Mexico; due west to the Pacific Ocean; and due north to the boundary of Canada. Between what parallels of latitude does Iowa lie? Counting seventy miles to each degree of latitude, find out how many miles the southern boundary of Iowa is from the equator. How many degrees farther from the equator is the northern boundary of Iowa than the southern? How many miles is it across the state from north to south? Between what parallels of longitude does Iowa lie?

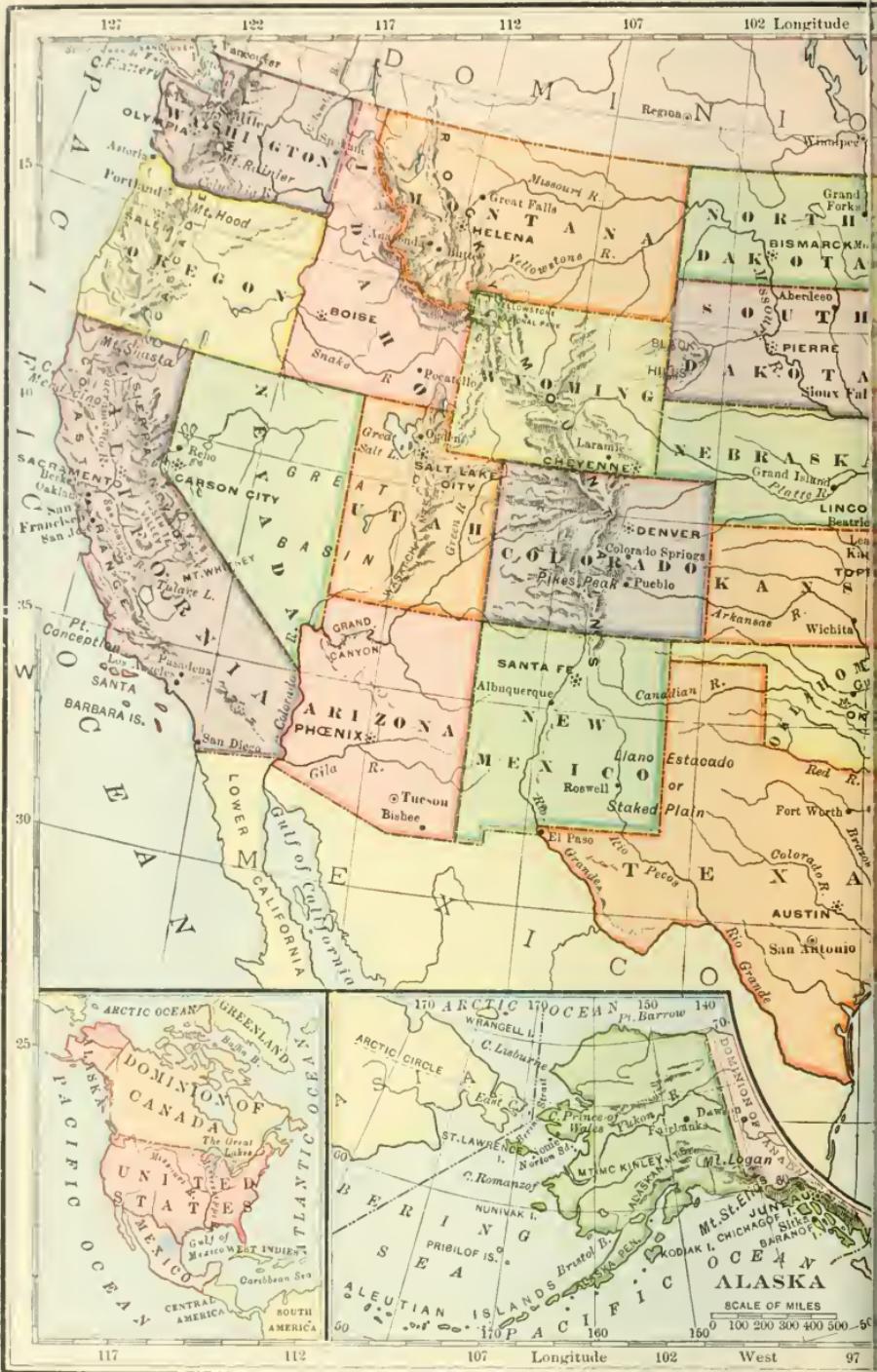
The state lies just far enough away from the equator and far enough from the great oceans to have the long, hot summer days which help to make it the fine corn state that it is. What is meant by the corn belt? What does the distance from the ocean have to do with the heat of our summers? Iowa is near enough to the Gulf of Mexico to have plenty of rain brought to it by the winds which come from the south and southeast. If we were farther away, as are Nebraska and the Dakotas, we should have less moisture.

New York City on the Atlantic coast is the largest American city. Find it on the map of the United States. Point in the direction in which you would go to reach it,—not on the map, but from your school. Let us find out how long it would take to make the trip to New York. By what railroad should you leave your town? Consult a railroad map. Trace your route as far as Chicago. How long does it take to go there? How much does it cost at three cents per mile? You would change to another railroad there. Choose one of the leading routes and find how far it is from Chicago to New York.

Trace the trip. Find out how long it would take and how much the railroad fare would be at three cents per mile.

As you look at the map of Iowa (Fig. 82) you notice that it has many railroads. In what directions do most of them run? There are several reasons why we have so many railroads. The state lies in the shortest path between Chicago and the Pacific coast. The surface of Iowa is level, and railroads are more cheaply and easily built here than in a rougher region. In the third place, Iowa has a large amount of grain and live stock to ship out and can afford to have many other things imported. You can find on page 123 the names of some of the most important railroads. What is a trunk line? Locate six trunk lines on the map in this book (Fig. 82).

Now you may write an answer to the question at the head of this section and include in it several reasons for your answer. Look at the map of the United States and choose some other state to compare with Iowa on these points.



CHAPTER II

THE WONDERS BENEATH OUR FEET

THE ROCKS WHICH LIE BENEATH US

If you should dig down through the soil in your garden or field, in time you would come to solid rock. In some parts of the state you would have to go down only a few feet, in other places hundreds of feet. This solid rock is known as bed rock. Ask someone who has dug a well in your neighborhood whether he can tell how far it is down to bed rock. We shall find out how this bed rock was made.

Let us imagine ourselves back in the period when all Iowa and all the Mississippi basin was a great ocean. Then the only land in what is now our continent of North America was in what is now the Appalachian Mountains and the Rocky Mountains. Look on a map of North America and see how large that old ocean must have been. Imagine if you can that in the part of that ocean which today is our state there were millions and millions of little shell-covered animals and coral animals with limy skeletons, growing in great reefs or banks, in shallow, clear water. Corals are growing in just this same way today around the shores of Florida. When these animals died, their shells and skeletons were broken up into fine pieces. These sank to the bottom of the ocean, and, with the lime which was constantly being added by the waters running from the land, built up the great beds of limestone that lie under the soil in so many Iowa counties. Have you ever seen a place where the layers of limestone were very near the surface of the ground?

In a great many places in the state the limestone is quarried and used for building and bridge work, or is crushed for road-making, or is burned to make the lime which is used in plastering your houses.

Most of the limestone which is used in building churches and schools and other public buildings comes from other states, since much of ours crumbles too easily to make buildings which will last. Scott, Jones, Dubuque, and Lee are important counties in the production of this stone. In what part of the state

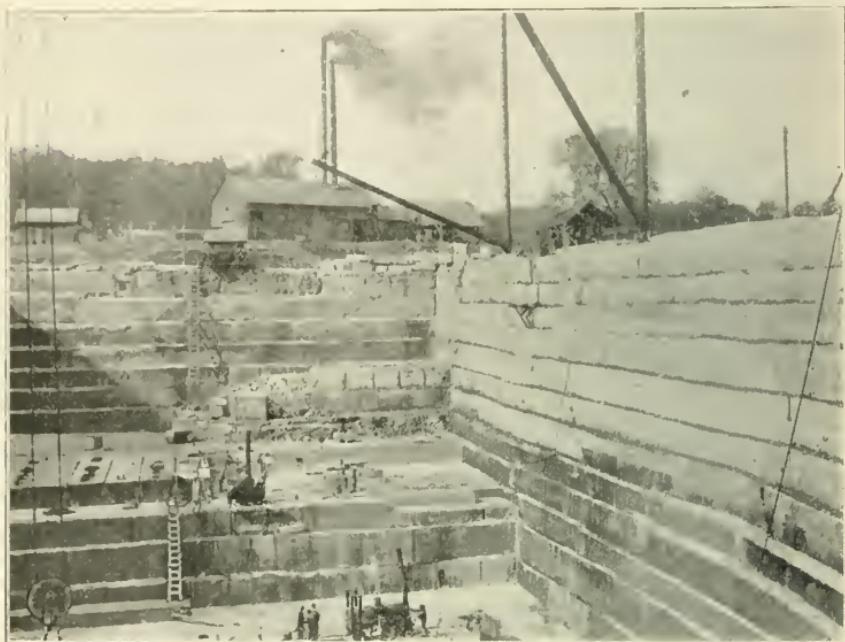


FIG. 2. In this limestone quarry great saws cut down through the layers of rock, separating the stone into blocks. Then wedges are driven between the layers. If you look carefully you can see some of these cuts on the upper level. Notice the machinery used in hoisting the huge pieces of stone. What is the difference between a quarry and a mine?

are these counties? Is any limestone quarried in your county? If so, find out for what it is used and where it is sent. Can you find a place where limestone has been used in your locality? (Look up the value of Iowa limestone production as given on page 156.) (See Fig. 2.)

After thousands and thousands of years the earth gave a long, slow, gentle heave, and this part of the continent began to show as dry land. First, northeastern Iowa came above water, and there was dry land in Allamakee, Winneshiek, and Clayton

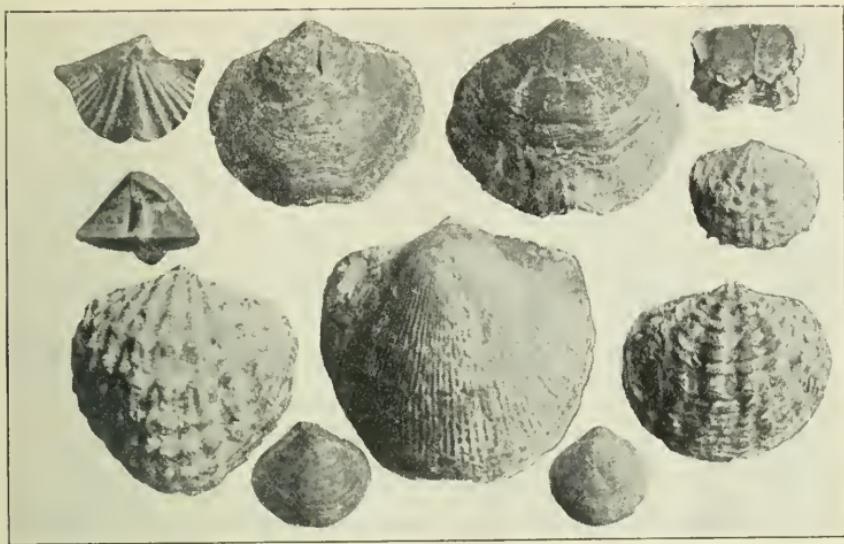


FIG. 3. These are small animals which lived in the ocean that covered the region where Iowa is today. These fossils can be found in many of our rocks. We call them brachiopods

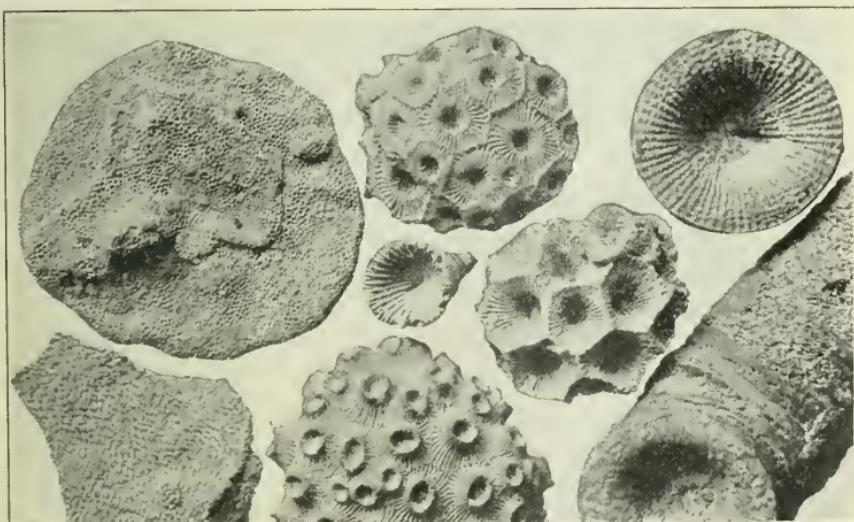


FIG. 4. Here are shown some of the ancient corals which helped to make the beds of limestone that underlie such a large part of the state. Have you ever found any corals that resemble these?

counties. The rivers brought down from the land to the north great loads of clay and sand and laid them down in the shallow water just beyond the shore line. By and by the sand hardened into sandstone and the clay into shale. Today we may find beautiful beds of this sandstone near McGregor, stained in many different colors by iron—reds and pinks and yellows. If you should look carefully in some of these beds of limestone, sandstone, and shale you would find little shells which have been buried but which, in some way or other, have escaped being broken. They are called fossils, and they show what kinds of animals lived at that time (Figs. 3, 4).

Very, very slowly the ocean drew back toward the south, until all Iowa was dry land. Then the surface rocks began to decay and form soil. At first the water ran off the surface of the land in sheets, just as water runs off when you pour it on the walk. Soon these sheets of water cut a little more deeply into the rocks in some places than in others, perhaps because some rocks were softer. After a while most of the water ran off through these little channels, forming tiny streams. These little streams grew larger and cut deep valleys. Could you show these things on a sand pile? Vegetation crept over the plains and the hills, but it was not at all like the vegetation which we see in Iowa today, and the animals which we know were not to be found here then.

IOWA'S COAL FIELDS

Many years after Iowa became dry land there came a time when much of the southern part of the state was very swampy. The same thing was true in parts of Illinois, Ohio, Pennsylvania, and many other states. In those old days the air was very moist and differed perhaps in other ways from the air of today, so that plants grew very rapidly. In these swamps and in other places in the state great forests grew, but the trees in them were not at all like the trees which you find here today. In the places where these trees fell on the dry land they decayed and helped to enrich the soil just as rotting plants do everywhere

IOWA Coal-producing Counties

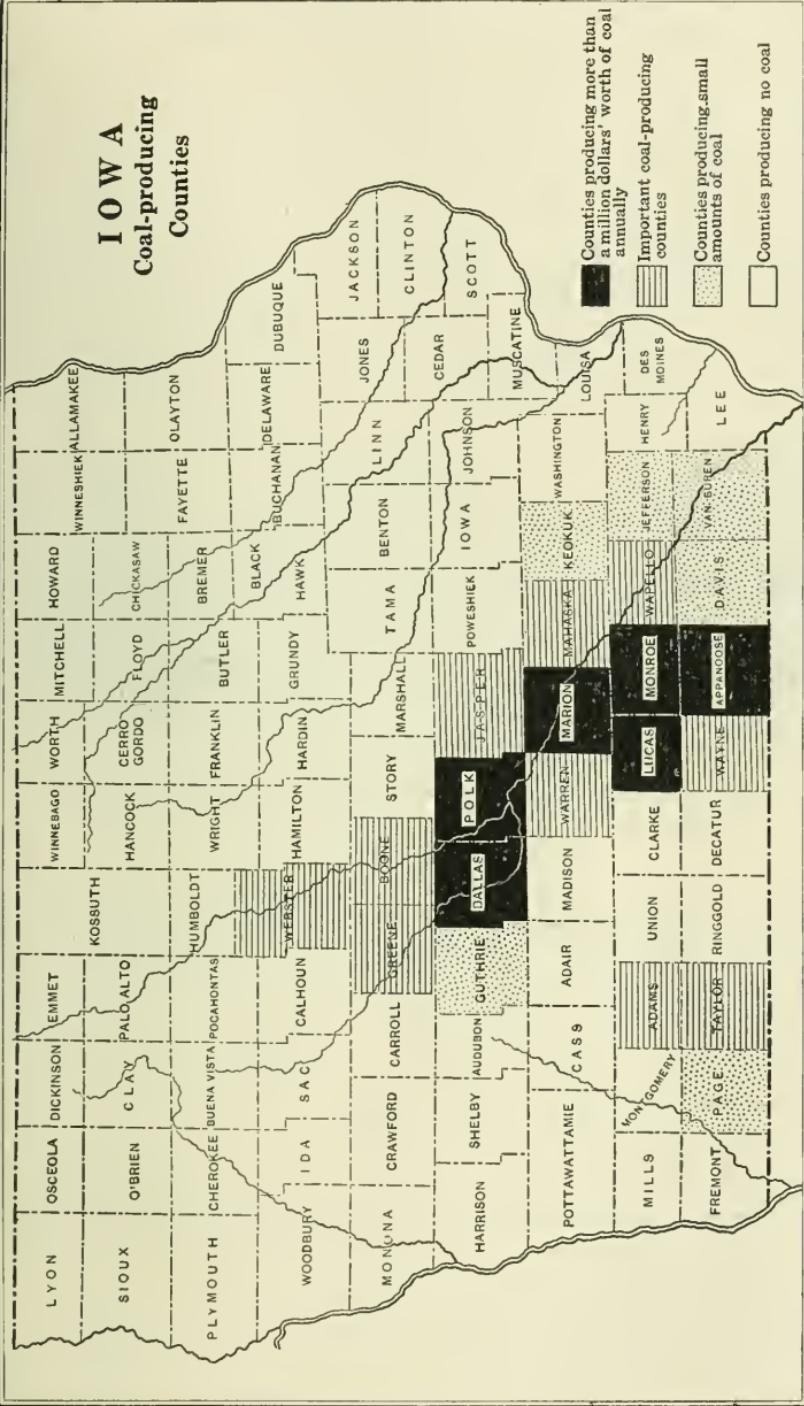


FIG. 5. Map showing parts of Iowa where coal is mined. Why does it not pay to mine it in some places?

today, but where they fell into the water of the swamps they were preserved from decay. After centuries had passed and immense layers of wood had accumulated in the swamps, the whole region sank a little and the swamps were filled with clay brought in by the rivers. This piled up in such thick, heavy layers on top of the fallen trees that they were squeezed and pressed until they changed to thin beds of what we know as coal. The clay above them gradually changed into layers of rock which we call shale. Have you ever found pieces of this shale in your coal bins? We often speak of it as slate.



FIG. 6. The Des Moines River in Marion County has cut through a coal seam, exposing the edges of the seam in the valley walls. In a place such as this it was easy for men to find coal

Today in south-central Iowa we are digging the coal which was formed millions of years ago. It is a fair grade of soft, or bituminous, coal. In a recent year we mined more than \$24,000,000 worth. Fig. 5 shows the chief coal-producing counties. Each of those which are completely black produces more than \$1,000,000 worth yearly. From where does the coal come which you use at home?

You may wonder how men first found out that there was coal in Iowa. If you look at Fig. 6 you can easily tell.

Write a short story telling what you think the men might have done when they first saw this coal.

Fig. 7 shows how most of the coal of Iowa lies. It is under many feet of rock. If a man owning land in one of the coal-producing sections of the state thought there might be

valuable coal under his land, he might hire someone to come with a small-diameter drill and drill holes in several places. If he found in this way that the layers of coal were thick enough to pay to mine, he might sink a shaft. Find in some other book a description of the shaft and of the way in which coal is taken out of the ground. The greater part of the mining in this state is done in coal beds from 4 to 6 feet in thickness, but in Marion County we have beds as thick as 16 feet. Coal beds extend for miles, one great bed often underlying from 500 to 600 acres. We do not have to go very far beneath the surface for our

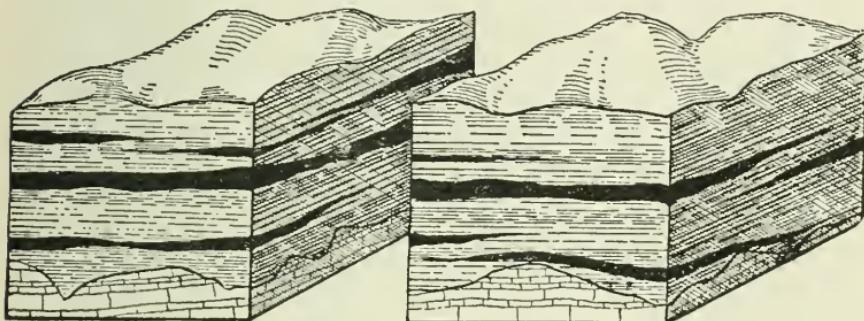


FIG. 7. These blocks show how the coal of Iowa lies in seams, buried under the rocks. The black bands are the coal

coal. The deepest mine in the state is only a little more than 300 feet in depth. When you read that coal mines in other countries are sometimes as deep as 4000 feet, you will realize that ours are very shallow. Could mining be done underneath a town without disturbing buildings or streets?

OUR DESERTED LEAD MINES

During all the years when the strange things we have just discussed were happening, the underground waters which were creeping so slowly through the rocks in eastern Iowa were gathering together the tiny particles of lead and zinc therein and depositing them in the cracks and crevices of the rocks. The particular kind of rock in which these lead and zinc ores were laid down is called galena limestone, and in Iowa it is

found in Dubuque County and the region near there. In what part of the state is this? It was thousands and thousands of years after the lead was laid down in these veins before men ever found it. In the days before the white men came into this state the Indians used to dig out lead which was not very far beneath the surface and take it across the river to sell at the different trading posts. The white men bought it to use in



FIG. 8. Water's old lead smelter near Dubuque is said to have been the earliest smelter built in Iowa. Notice the great limestone bluff and the limestone used in the building

making bullets. Across what river did the Indians carry the lead? One place where they sold it was Prairie du Chien. How far is this from the present city of Dubuque?

One day, in the year 1785, there came to this Wisconsin trading post a French Canadian named Julien Dubuque. He made friends easily with the Indians. Three years later he persuaded the Fox Indians, who worked the mines, to allow him to mine the lead in a strip of land west of the Mississippi, near what is now Dubuque (Fig. 8). This piece of land extended about twenty miles north and south. After making these terms Dubuque settled in the Indian village of Kettle Chief at the mouth of Catfish Creek. This is a little stream which flows

into the Mississippi just south of the present city of Dubuque. He called his works the "Mines of Spain." Can you find out why? The lead ore was so near the surface in some places that it was dug out with hoes, shovels, crowbars, and picks. After this it was smelted; that is, it was heated in a sort of furnace built of stone, until the lead was melted out of the rock with which it was mixed. The lead was then loaded into boats called *pirogues* (pí rōg') and sent down the river to St. Louis, where it was sold. It was then shipped still farther down, to New Orleans, and there loaded on ocean-going ships to be sent to the eastern part of the United States. Why was it taken east by this long and roundabout way?

After Dubuque's death, in 1810, the Indians destroyed his house and drove out the white miners who had been working for him. They then dug the lead and ferried it across the Mississippi to sell to the white men who lived on the east side of the river. These men were eager to come across to our side and dig the lead themselves, but the United States would not let them come, because this part of



FIG. 9. This wonderful statue of Black Hawk, designed by Lorado Taft, stands on a bluff above Rock River near Oregon, Illinois. "This is a noble tribute to the great Indian chief in the land his tribes once possessed." Explain why this is a suitable picture for a geography on Iowa

the land of Iowa still belonged to the Indians. Sometimes soldiers had to be stationed at Dubuque to keep the white men out. On a bluff not far from the village where Dubuque lived a simple monument of stones has been erected to his memory. You may see it from the Mississippi River.

In 1832, at the close of the Black Hawk War, which you will read about some day, the United States bought a big piece of land from the Indians; this is known as the Black Hawk Purchase. It extended most of the way along the Mississippi River from the Minnesota line to the Missouri line and fifty miles westward from the river. Who was Black Hawk? (See Fig. 9.) The next year the white men were given permission to cross the river. In the first twelve months about five hundred came over at this one place, so you can see that the little village grew rapidly.

For the first few years all the lead mined was shipped away, but later a shot tower and white-lead works were built. The shot tower is interesting. A spot was chosen along the high bluffs near the town, and shot was made by dropping the molten lead from the top of the cliff into a shot well at its foot. As the drops of hot lead whirled through the air the bullets were formed. White lead is used for making paint. Look on the outside of a paint can to find out how much of paint is lead.

In the mines the zinc usually lies below the lead, so it was not mined until later. It was also harder to smelt, and in those days people had no special use for it. For what is it used today? The lead and zinc mines of Iowa have not been worked for a number of years because they are deep now and water must be pumped out. This makes mining expensive. The mining may be done much more cheaply and profitably in Missouri and other states where there are larger supplies of these ores.

THE IRON ORE OF IRON HILL

Every yellow or red or brown color which you see in rock or clay is due to the presence of iron. It is scattered everywhere throughout the surface of the earth. Have you ever

used water which had a strong taste of iron? In what other way could you tell that there was iron in the water? When you see light-yellow or dark-yellow soils you may know that the iron particles in them have decayed or rusted and made these colors. Iron scattered in such tiny particles is of no



FIG. 10. This view was taken in the mine of the United States Gypsum Company at Fort Dodge. How is the gypsum taken out of the mine?

use to men for manufacturing. It is only when it has been gathered together by creeping, underground waters and laid down in large quantities that men can use it for making iron or steel.

We have one such deposit in Iowa, but it is not a very large one. This is in northeastern Iowa, in Allamakee County, two and a half miles northeast of Waukon. Locate this place approximately on the map, p. 52. It is known as Iron Hill. Not much iron has been mined there because it can be obtained so much more cheaply in other places, such as northeastern Minnesota, near Duluth.

OUR GYPSUM BEDS AND THEIR USES

We have one of the richest gypsum deposits in the whole United States. Perhaps you have seen some of this material used in your homes for plaster or on your farms as fertilizer. Webster County has 60 or 70 square miles of land underlain with gypsum. The beds are from 25 to 30 feet in thickness. Gypsum is a rather soft, light-gray rock.

A shaft is sunk and the gypsum rock is mined in much the same way as coal. After it is taken from the mine the rock is run through crushers, which break it into rather coarse pieces. At the mills near Fort Dodge the crushed gypsum is put into great drying tubes, which take out much of its moisture. After being dried it is pulverized and is then ready to be used for fertilizer. Sometimes it is heated again in large vats, where all the remaining moisture is driven out. This product is known as calcined gypsum, or stucco. When this is finely ground it is used for wall plaster, plaster of Paris, or for making paints. What happens when you mix a little water with plaster of Paris? For what is plaster of Paris used?

The first gypsum mill built west of the Mississippi was located at Fort Dodge and began work in 1872. The mills now working near that place produced nearly \$2,000,000 worth of gypsum in a recent year (Fig. 10). Only New York State produces more.

Iowa has another gypsum deposit at Centerville, but this has been worked only a short time. In what county is it?

On an outline map of Iowa, showing the counties, mark in some way all the mineral-producing counties which we have found.

CHAPTER III

STORIES OF THE PAST AND PRESENT

How IOWA'S SOILS WERE MADE

Many years after the coal was made and the minerals we have discussed were gathered into beds, it turned so very cold in the north country that the snow which fell in winter did not all melt in summer. Then year after year it grew still colder, until in summer also some of the moisture fell as snow. This continued until great beds of snow more than a mile in thickness covered a large part of the surface of the present Canada. By and by, because the snow was so heavy and the cold so great, and because sometimes the surface melted a little and the water filtered down through, the whole mass turned to ice. You have probably all seen this same thing happen to the bottom of a snowdrift when it has lain in your yard during several cold winter months.

After many years this great mass of ice began to move out in all directions. This movement was partly due to the fact that it was very much thicker in some places than in others. As it pushed slowly southward into what is now the United States, it carried great blocks of stone which were frozen into the bottom of the ice. Some of these it picked up on its way south through what is now Minnesota, Wisconsin, and New England. These big, hard pieces of rock ground against each other and against the rocks over which they were dragged until the corners were broken off and the edges were rounded. Often the whole piece was pulverized into a powder which we call rock flour. For years this enormous ice-sheet crept southward, wearing off the hilltops and scouring out the valleys, until it covered the present Iowa and went beyond our southern boundary and halfway across what is now Missouri.

Can you close your eyes and imagine all Iowa covered with a sheet of ice over half a mile deep—no animals, no grass, no trees to be seen, only a great white blanket in every direction?

Perhaps you are wondering what happened to all the animals which had been living here. When it first began to turn cold a large number of plants could not stand the change and died. The animals that lived on these plants had either to change their food or move south where the plants could still be found. Then as the summers grew shorter and colder, until at last there was no summer at all, every plant died and all the animals migrated southward or died. It is thought that there were no human beings in North America before the Ice Age.

After a time the climate grew warmer, and very slowly the ice began to melt. The southern edge was thinnest and the heat was greatest there, so that edge melted first. Gradually all the area that is now called Iowa was uncovered. As the ice melted, all the rock flour and broken rock—gravel, pebbles, and small stones, as well as the great pieces which are called bowlders—were dumped together. In some places large quantities of this material, called glacial drift, were dropped, making hills. In other places the glacial drift was spread very evenly. In some parts of the state a layer more than a hundred feet thick was left on top of the bed rock, while in other parts only a few feet were deposited. All over Iowa, except in a little section in the northeastern part of the state, which you may find by looking at Fig. 11, this glacial drift was spread. If you will find out how far people in your neighborhood have to drill before they strike rock, you will know how deep the glacial drift is there. This will be true everywhere, except on the river flats (where the rivers have made changes) or where the wind has piled up fine soil.

After a long time the seeds were carried back from the south, and very gradually this glacial area once more became covered with grass and trees. Some of these seeds must have been quite heavy. How do you think they were carried back? Remember there were no people here in those days. Later, when there was food, the animals came back from the south.

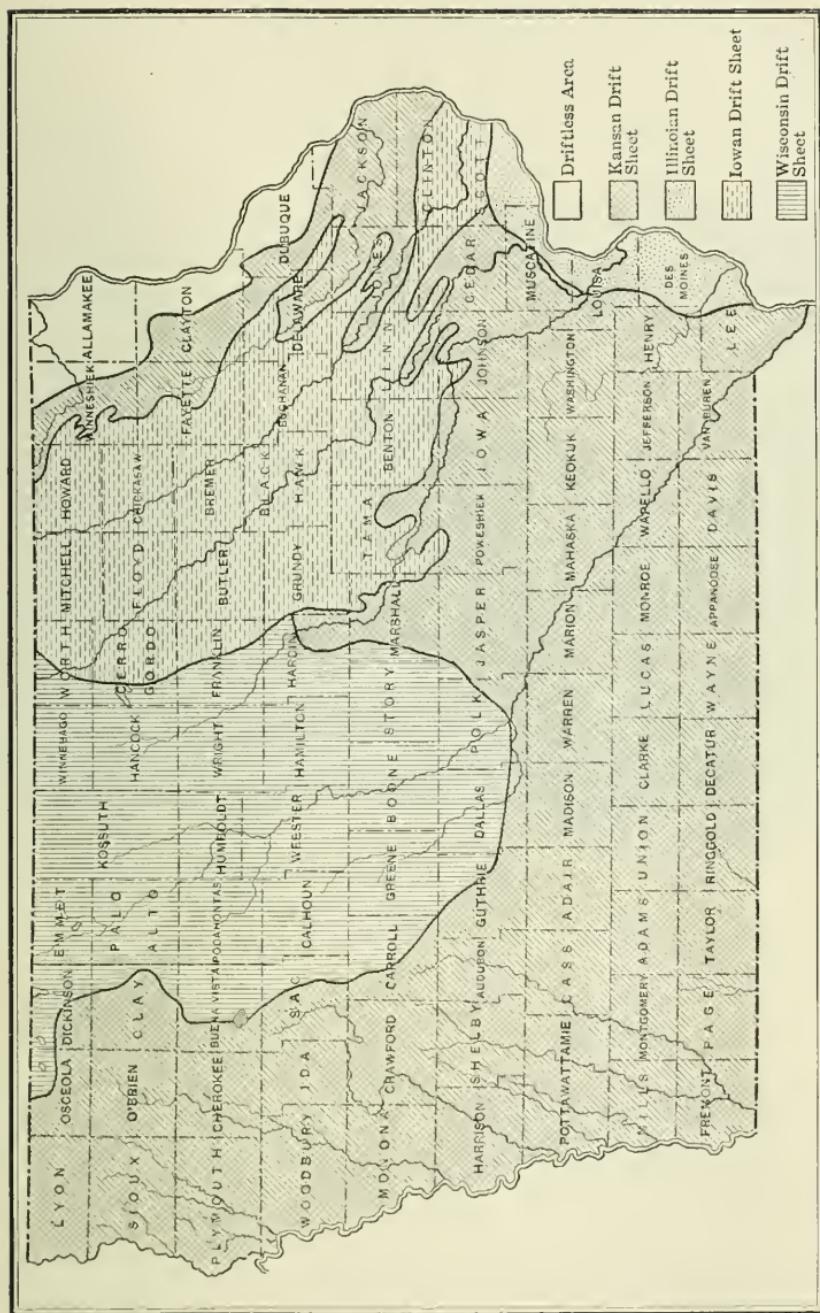


FIG. II. Map of Iowa showing the parts of the state covered by the different drift sheets

In those days elephants and mastodons and wild horses roamed about and fed on the grass and in the forests. We know this because fossil bones of these animals have been found in the gravels of Harrison and Monona counties and in many other parts of the state. Look at the picture (Fig. 12) of the lower jaw of one of those old elephants. This jawbone was found in the drift sheet near Marengo. In Henry County elephant bones have been found, and recently men digging a sewer in Waterloo found the shoulder bone of an elephant. Find out if any similar remains have ever been found in your county and what was done with them. Thousands of years later it grew cold again, and the ice once more came south. With the warming of the climate the ice melted as before. This happened several times before the present climate became established.



FIG. 12. This is the jawbone of an elephant which roamed over Iowa in a warm period between two advances of the ice. Notice the single great tooth on each side. This fossil was found near Marengo. In what part of the state is that?

Five different times these great fields of ice pushed into this area, and in melting back each one left a sheet of drift. The first of these was completely covered by the others. Parts of each of the other four are to be seen at the surface. Men have come all the way from Europe to see this peculiar formation. Are you sure that you have looked closely at the drift on which you live? If you look at Fig. 11 you can find the name of your drift. Find a creek, a bank, or a place where someone is

digging a cellar or sewer. See if you can find rock flour (that would be the finely ground clay), gravel which was not ground up so fine, pebbles, and large stones. Sometimes you can find on the larger rocks scratches which show that they have been rubbed against some harder stone. Most of the large boulders



FIG. 13. In Floyd County, near Charles City, lies this granite boulder, one of the largest in the state. It was carried in the ice all the way from what is now Canada and has lain in its present place for thousands of years. Have you any such granite boulders in your county?

are granite, which is very hard. They were carried on top of or somewhere in the ice mass (Fig. 13). If they had been underneath they would have been rubbed to powder as the others were. The Kansan drift sheet is the oldest which is to be seen at the surface. It has lain so long that it has been well cut and drained by rivers and is therefore very hilly in many places. Have you ever been in that part of the state which the map shows as Kansan drift? You will not find many boulders on the surface of this area. Those which were brought have had time to rot and crumble into soil. The Wisconsin drift sheet was left by the ice the last time it pushed into this area. This

sheet is so young that not sufficient time has elapsed for the rivers to cut it up and drain it. Hence the farmers in that part of the state have to do much tiling to drain their fields. In a few thousands of years the rivers would do that work through their little branches reaching into all the level fields and swamps. Some of the swamps are peat bogs. There are large peat bogs in Emmet, Palo Alto, Kossuth, and Clay counties. Have you ever heard of any of these bogs' catching fire?



Fig. 14. North Twin Lake in Calhoun County is one of the beautiful glacial lakes of Iowa. On what drift sheet is it?

If you will compare Figs. 11 and 21 you will see that all our lakes are on one drift sheet. Which drift sheet is it? Look up the names of these lakes on a map of Iowa. Can you find in the text any pictures of lakes? Of what use are they to the people of Iowa? These lakes are in little hollows which the ice made when it piled more material in some places than it did in others. Do you live on the Iowan drift? It is not so poorly drained as the Wisconsin nor so well drained as the Kansan drift. It has a great many big boulders, as you will notice if you take a ride across it. Some of the finest farm land in the state is on the Iowan drift.

If you look at Fig. 11 you will notice a region that is driftless. What does that word mean? Every time the ice moved into that part of the state, the edge which came into these northeastern counties was so thin that it did not smooth off the rocks and did not carry in any soil. If you should go into Allamakee, eastern Clayton, Winneshiek, or Dubuque counties and see the rocky hills and deep-cut valleys, such as those you see in Figs. 15 and 16, you could imagine what Iowa



FIG. 15. This great hill is made up of sandstone with layers of limestone on top. It is known as "The Elephant" and is located near French Creek in Allamakee County. Once the country about here was nearly level and higher than the top of this hill. The frost and rain and rivers have worn away thousands of cubic feet of rock from this region and carried it toward the Gulf of Mexico. Study the picture carefully. It shows exactly how the driftless area of Iowa looks. Write out a list of the ways in which it differs from the drift-covered area

would have looked like if there had been no ice-sheet. Fortunately for us it covered most of our state with a deep, rich soil so that our farms yield large crops when we care for them properly. A great geologist, Samuel Calvin, once said, "Iowa's soils are worth all the gold and silver mines of the world combined." How can this be true? Study Fig. 17 before you answer. Have you ever seen any soils which were being neglected? What would you do if they were yours?

Read in some reference book about different methods of improving poor soils. Why do you suppose we have spent so much time studying about soils? Write out your answer to this question.

You have read the story of how Iowa has been made,—its rocks, its minerals, and its soils. It took a long time—no one knows just how long—to make the state ready for men to live



FIG. 16. Much of Iowa might have looked like this if the ice-sheet had not moved over the state. If the heavy part of the ice-sheet had passed over here what would have happened to this beautiful ledge of rock in Allamakee County?

Find Allamakee County in Fig. 11

in. No men lived here during the years which we have described, yet the story of all that happened is written clearly in these rocks, minerals, and soils for all who are able to read their language. A few of the pages of this story have been destroyed because some of the layers of rock have been worn away by rain and frost, by rivers and ice, but enough has been left to tell us what wonderful plants and animals lived here in times past, and how they changed until they became the plants and animals which you know today.

IOWA RIVERS

When rain falls on your school yard what becomes of the water? If you should follow the water which runs off the surface you would find that it flows into some little creek. Can you find that creek? Somewhere it runs into a river. What river? On the map of Iowa (p. 52) find out in what direction that river flows. From the Iowa map and the map of the United States (p. 4) trace the water till it flows into the Gulf of Mexico.

A river basin is all the land that is drained by a river and its tributaries. The valley is the depression or cut that is made by the stream. Can you step across the valley of your small

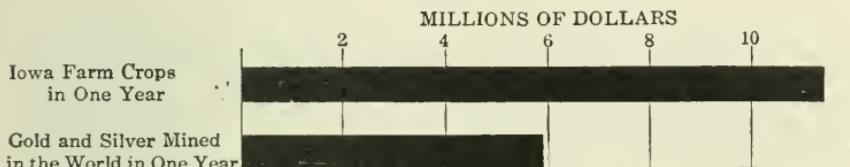


FIG. 17. Graph showing comparative values of Iowa farm crops and all the gold and silver mined in the world in one year

creek? How many feet wide is it? How far is it across the basin of the creek? In how many river basins do you live? Begin counting with your own creek. In what direction do most of the rivers of Iowa flow? Draw a small map of Iowa and put in the Des Moines River, indicating the important city located on that river. Why is it important? In what county is it? Judging from the direction in which the rivers run, where is the highest part of the state? Look in the back of the book (p. 157) to see if you have judged correctly.

The Mississippi River. The Mississippi River has been very important in Iowa's history because by means of it white men first entered our state. June 17, 1673, was the day on which white men first saw Iowa. A French missionary, Father Marquette, and a French explorer named Joliet, starting from Green Bay in Wisconsin, went up the Fox River in birch canoes with a few Indian guides. They carried their canoes from the

Fox to the Wisconsin River and floated down to the Mississippi. Find a map of Wisconsin and trace their route. Where did they first see Iowa? (See Fig. 18.)

On the Iowa side of the river they saw beautiful high limestone bluffs carved by the river, the rain, and the frost into all sorts of wonderful shapes—like towers, turrets, and pinnacles rising above the great stone walls of some ancient city.



FIG. 18. This is the part of Iowa which was first seen by Marquette and Joliet. What two rivers are shown? Can you picture the canoes of the explorers coming down the river in the distance?

In some places great blocks of rock had broken off the bluff and slid down toward the stream, and everywhere the rocks were covered with a beautiful carpet of flowers, ferns, and mosses. These were shaded by the trees and shrubs which covered the slope from top to bottom, growing in the cracks in the rocks and on the gentle slopes where a little soil had gathered. Why is this part of the state more rugged and picturesque than other parts? Describe the scene that Father Marquette first saw in Iowa. Make a picture of it.

Not a white man nor even an Indian did these explorers meet as they paddled on down the great river for many days. When they landed each day they caught fish or killed what game they needed—squirrels, perhaps, or wild turkey or prairie chicken or quail. When they climbed to the top of the bluffs and looked off toward the wide prairies, they could see herds of buffalo and elk feeding. Think of riding past these shores where so many cities are today and seeing not even one house!

One day toward the end of the month, when they landed on the west bank, perhaps to find game for a meal, they discovered some footprints of men and, following the footprints up the bluffs, came upon a path. The two Frenchmen walked along this for miles, until they saw columns of smoke, which told them of an Indian village. Soon they came to the wigwams, which stood on the banks of a smaller river flowing into the Mississippi. This is thought to have been the Iowa River. The explorers stayed with these Indians for six days, going on hunting expeditions and feasting on their choicest foods. What were some of these foods? Trace on the map (p. 52) the path which these men might have followed to the Indian village. In what county would it be?

Marquette and Joliet went on down the river, having many stirring adventures with the Indians, until they came to the mouth of the Arkansas River. Find this on a map of the United States. Then they returned to Canada by way of the Illinois River and Lake Michigan.

If you had lived in 1805 you certainly would have enjoyed the trip which Lieutenant Zebulon Pike was ordered to take by the United States government. He was told to start from St. Louis with twenty soldiers, in a boat seventy feet long, and explore the Mississippi to its headwaters. The Mississippi basin was a part of the great territory which the United States had just bought from France, and we wished to find out more about it. We called the land we bought, the Louisiana Purchase. Can you find out from a history how large it was and how much we paid for it? Pike and his party

Map of the United States



Map Plate, Patented July 5, 1921

RELIEF MAP OF THE UNITED STATES



took with them provisions for four months. At that time white men had done very little exploring along the upper Mississippi. Would it not have been an exciting experience to row along the river in those August and September days, always in suspense as to what adventure might come next? Notice the date, and name a man whom they might have expected to meet on the trip. They had great difficulty in coming through the Des Moines Rapids, which are eleven miles above the place where the Des Moines River flows into the Mississippi River. These are the rapids which are now used to make power at the Keokuk dam (Fig. 23). Fifteen Indians and a white man who was living in one of the Sac Indian villages teaching the Indians to farm helped Pike get his boat across the rapids.

Pike had been told to select a spot for a fort somewhere between St. Louis and Prairie du Chien and to ask the Indians for permission to build it. This is what he reported: "I have chosen a site on a hill forty miles above the De Moyen rapids on the west side of the river. The hill is about sixty feet perpendicular, nearly level on top." About three years after this an officer and a company of soldiers were sent to build the fort; in honor of the president they named it Fort Madison. They really had no right to build this on Indian land, and the Indians attacked it again and again. One September night in 1813 the Indians surrounded the fort, but while it was dark and cloudy and the wind was roaring through the forest the soldiers crawled quietly out on their hands and knees without arousing the Indians. The last man to leave set fire to the fort. Reaching their boats they pulled out from shore and were beyond rifle shot before the Indians knew of their escape. Later, a city built on that spot was given the name of the fort. Find this city on your map. If we had time to study the cities along the Mississippi we should find that many more of them had exciting early histories. Try to find out how your town started, and write a short story about it.

We left Lieutenant Pike on the river. Let us travel upstream with his party. In some places they found the river wide and

full of sand bars, in other places narrow and steep-sided. Their report tells us of rich lands covered with black walnut and hickory trees near the river and of beautiful prairies stretching for miles to the west. On the first day of September they came to the "Mines of Spain." To whom did these belong? The owner did not seem willing to tell much about his mines; perhaps he was afraid that others would find out how rich they were. Pike tells us that as he went along the river he noticed that the Indians were much afraid of the white men. How long ago was this trip made?

We have studied something about the early history of the Mississippi. Let us see what uses the early settlers made of the river. When did white men first come across the river to build permanent homes? If we had lived in Iowa soon after that time we should have seen many steamboats on the river during the summer; why not in winter? As early as 1859 there were steamboats running from Dubuque by way of New Orleans and New York to Liverpool and Bristol, England. Twelve years after, boats ran twice a week from Dubuque to St. Paul. Most of the boats ran between St. Louis and Dubuque because St. Louis bought many things that Iowa had to sell. What did Iowa have to sell in those days? Make a list. Do not forget that many men made a living in winter by trapping and hunting.

Many people took pleasure trips on the river, so excellent, comfortable boats were made. Why do we not find them on the river today? Find in this book all the pictures you can of scenes along the Mississippi and decide whether it would be worth while to take a trip upstream from Keokuk. Perhaps we shall soon again see more boats on the river. The United States government has had some large steel barges built at Dubuque. These boats are three hundred feet long and forty-eight feet wide and will require a depth of eight and a half feet of water. They are large enough to carry three thousand tons of coal, but during the summer and fall, when the water in the river is low, they must carry much less than that. The government has leased them to the Mississippi Valley Iron

Company, which will use the boats to carry iron ore from St. Paul to St. Louis. No iron ore is mined at St. Paul. From where does it come? Towboats built at Stillwater, Minnesota, pull these heavy barges. One towboat will pull three barges. Many people will rejoice to see traffic once more on the upper Mississippi. More use should be made of rivers, as



FIG. 19. Great rafts of logs like this used to be seen on the Mississippi. Why are they not seen today? How were the logs joined? Do you see how the bridge opened to let the raft through? (Courtesy of Horning Studio)

the railroads are overcrowded with freight, and Iowa farmers have a great deal of difficulty getting their crops transported.

Besides the steamers for freight and passengers, you would have seen in those earlier days great rafts of logs coming downstream for the mills in the river towns (Fig. 19). The logs were floated downstream from Minnesota and Wisconsin. Trees were cut near the streams in winter and the logs taken to the banks, to lie until the ice went out in the spring. The logs then came down with the flood and were brought to the mills very cheaply. Dubuque, Clinton, Davenport, Muscatine, and other river towns had mills and cut a large amount of lumber.

A little later, because the lumber mills were there, factories were established for the making of inside finish for houses and stores,—doors, sashes, staircases, mantels, and similar products. This was in the sixties. There remain two large factories for this work in Dubuque today. One of them began operating in 1867 and the other in 1876. No rafts of logs come down the river now. The white pine in the states to the north has been largely cut down, and the factories have to obtain it from the west coast, in Washington and Oregon. How is it brought to Dubuque? How far is it brought? Yellow-pine lumber is imported from the South. What is the difference between white pine and yellow pine? Iowa buys its hardwood from the central part of the country, from such states as Kentucky and Tennessee. Name some hardwood trees. The mills run by steam-power, part of the fuel being shavings and waste wood. Can you think of two reasons why these mills continue although the supply of lumber which started them is gone?

Have we spent too much time studying the Mississippi River? Decide carefully and then write your answer, giving reasons.

The Missouri River. Do you know what the Indian word "Missouri" means? Look in a large dictionary. There is a very good reason for calling this river the Missouri, and for its nickname. The Missouri River bluffs are of loess (lō'ess), which is part fine clay and part sand. Through a long, long period the wind gathered the particles of clay and sand and piled them up along the edges of the valley. In time these piles were formed into steep cliffs. In some places these bluffs are quite high. They are higher on the east side of the river than on the west, because of the west winds. The wind has carried much of the loess of this region and spread it over other parts of the state.

The Missouri has a very wide flood plain, on which it winds back and forth. Once some travelers rowed eighteen miles up the river and found that, on a straight line, they were only nine hundred yards from the place where they started. In the spring—when the snows melt in the mountains where the

river and its branches rise, and the rains are very heavy—the Missouri goes on a rampage. In what mountains do the river and its branches rise? How far away is this? Often, when

the river overflows, new channels are started. Sometimes these cut so deep as to change the entire course of the river. Thus, instead of following the old course around a long bend, it cuts straight across a part of Nebraska, thus joining that part with Iowa. What might the river do to a piece of Iowa? (See Fig. 20.) This bottom land is very fertile, and fine fields of grain grow on it. Why is it so fertile?

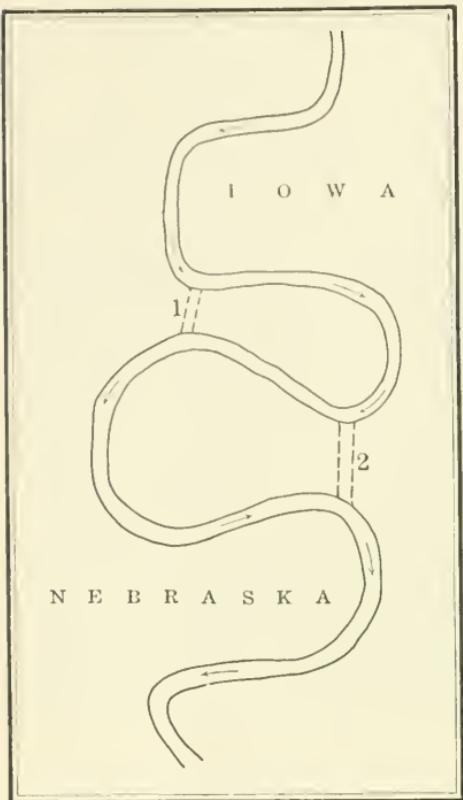


FIG. 20. A short cut taken by the river at the place marked 1 would give a piece of Nebraska territory to Iowa. The opposite result would occur if the river took a short cut at the place marked 2.

They began their trip in 1804. Was this before Lieutenant Pike took his exploring trip up the Mississippi?

We are told that they found it very hard work to row upstream, for the current was very powerful and carried great numbers of uprooted trees. This was in May. Would it have been equally difficult in August? They described the part of Iowa which they saw as a vast prairie over which roamed herds

When you study history you will read a great deal about the Lewis and Clark Expedition. These two men were sent to explore the Louisiana Purchase. They went by way of the Missouri River and hence along the shores of Iowa. How far would they follow the western edge of the state?

of buffalo, elk, and deer. Early in August they camped on a high, wooded bluff and held a council with six Indian chiefs. Lewis and Clark called the place Council Bluffs. This is not where the present city of Council Bluffs stands, but is on the west side of the river and farther north. On August 20 Charles Floyd, a young soldier in the party, died and was buried on a bluff overlooking the river. He was the first white man known to have been buried in Iowa soil. More than fifty years later Sioux City was laid out near this spot. In 1901 a monument in Sioux City was dedicated to Charles Floyd. See if you can find a river in this region which was named by this party.

Sioux City, the most important city of Iowa on the Missouri River, has had a very rapid growth. What is the origin of its name? The first mention we have of this locality is in connection with the burial of Sergeant Floyd in 1804. In 1853 a party of government surveyors working in the neighborhood thought this a desirable place for a town. They located claims and began laying out a city. What is meant by locating claims? By Christmas of the next year seven log houses had been built. When you go along the streets of Sioux City and see the busy down-town section, think of this: in sixty-five years it grew from a hamlet of seven houses to a city of sixty-seven thousand inhabitants.

We know that soon after steamboats began running on the Mississippi they ventured up the Missouri, but they did not go as far as Sioux City until 1856. Then a steamboat, loaded chiefly with provisions and materials for frame houses, arrived. You may well imagine that its arrival caused some excitement, since Sioux City was very far from other settlements. What do you think would be found on the shelves of a store in such a frontier town? Would you have found the canned meats and fruits that you find in stores today? Boats ran up the river as far as Fort Benton in Montana. Locate this on some map. What would they be likely to carry back? The first railroad to reach Sioux City came in from Missouri Valley in 1868. Then Sioux City probably felt that it had become a part of the world! Make a list of reasons why in so short a time

this place has outstripped all other cities of the state except the capital. Is there anything especially advantageous in its location? Keep your list, and you may be able to add to it when you have studied some other chapters in this book.

The Des Moines River. About fifteen years after Marquette and Joliet took their famous trip down the Mississippi, a Frenchman made a map of the Mississippi Valley in which he used the name "Rivière des Moingona." What river did he mean? Could Marquette have seen this stream as he went down the Mississippi after leaving the Indian village? A number of years later another Frenchman wrote:

On the left side about fifty leagues above the River of Buffaloes the River Moingona issues from the midst of an immense meadow, which swarms with buffaloes and other wild beasts: at its entrance into the Mississippi it is very shallow as well as narrow. Going up the Moingona we find a great plenty of pit coal.

This quotation shows us how different this region looked in those early days. How many miles are there in a league? In what county was this "immense meadow"? Look back at Fig. 6 and see how they happened to find the coal. This valley was an excellent place for Indian trappers and hunters. In 1779 the French had a fur-trading post on the Des Moines, two hundred miles above its mouth. Measure on the map (p. 52), to see where this would be. Here they found the Indian hunting camps and exchanged blankets, cloth, calicoes, tobacco, and cheap jewelry for the skins of the beaver, otter, deer, and bear.

In the days when southern Iowa was being settled, before there were any railroads, all supplies had to be hauled west from the Mississippi in wagons. This was very slow work, so wherever they could men made use of streams. At first their only boats were flat-bottomed, clumsy affairs which were pushed upstream with poles. When the steamboats came they could take larger loads and go much more quickly. In 1837 a steamboat went up the Des Moines as far as Keosauqua. How far is that? This boat was loaded with flour, corn meal, dry goods, and whisky. Five or six years later steamboats took

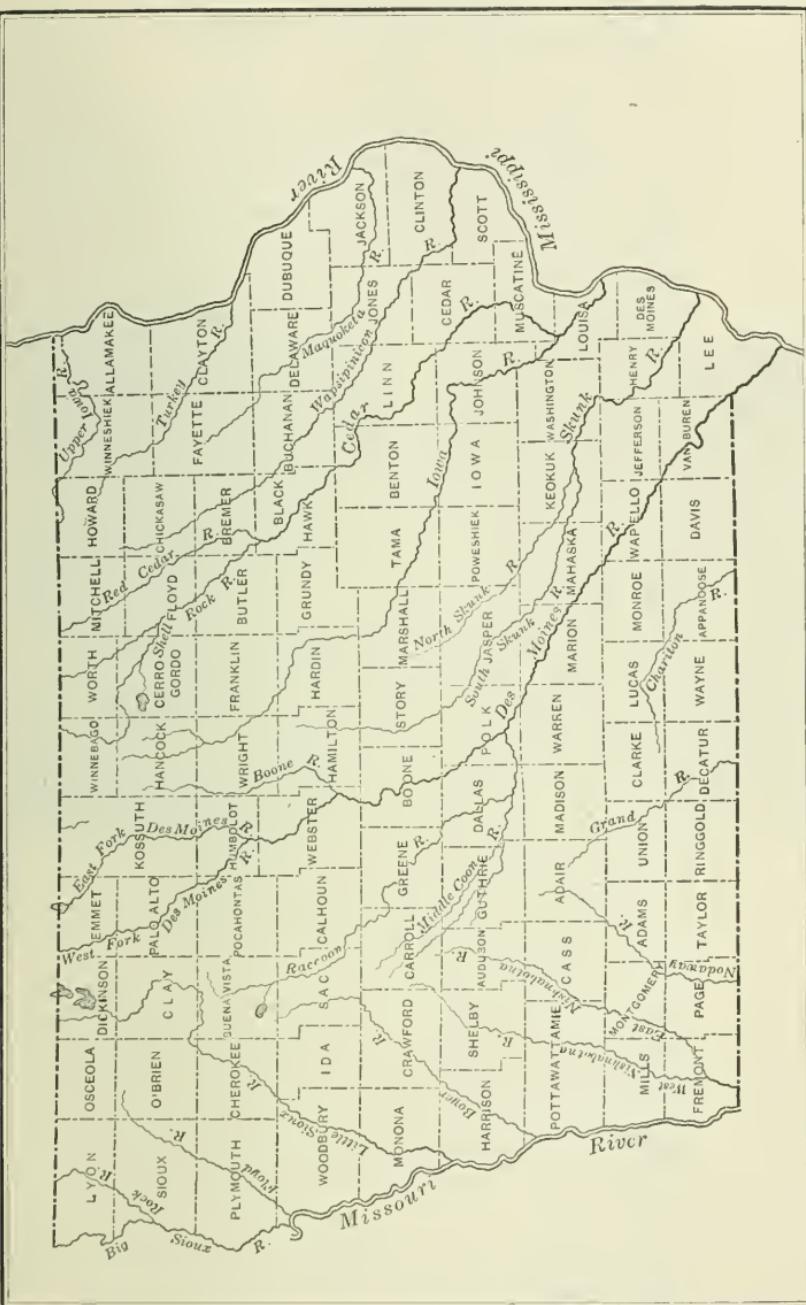


FIG. 21. Drainage map of Iowa

supplies as far as Des Moines for the garrison of soldiers located there, and still later they went as far as Fort Dodge. About this time Iowa people were very eager to have Congress appropriate money to dredge the rivers so that they might be more easily used for steamboats. Why do you suppose this was never done? Perhaps you can answer this more readily after



FIG. 22. The Center Street dam in Des Moines shows one of the many uses to which our rivers are put. Explain how power is generated at such a dam. What is a turbine?

you have read about Iowa railroads in the chapter on transportation. Are there steamboats on the Des Moines now?

Iowa has so many rivers that it would not be possible to describe each one in this book. You will have to find out many things about them for yourselves. You can easily do this as you talk with people who have been in other parts of the state. Everyone who knows and loves rivers has his favorite. Which is yours? As you look through the book you will find many beautiful river pictures. Which one do you like best?

Rivers not only add to the beauty of scenery but are exceedingly useful. Council Bluffs obtains a part of its water supply

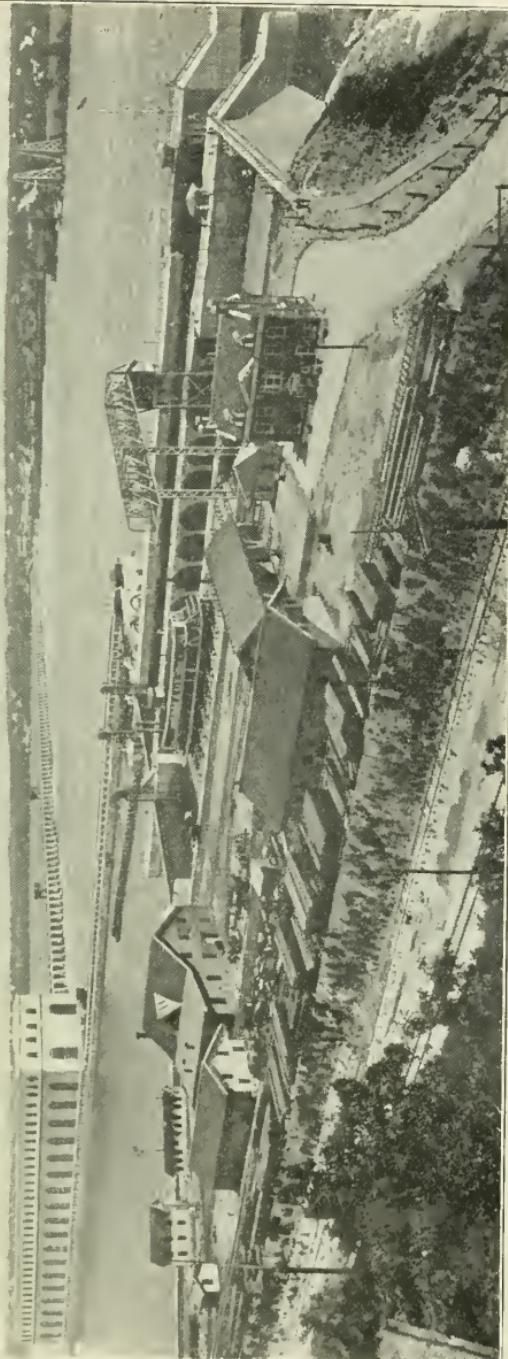


FIG. 23. You are standing on the Iowa side of the Mississippi, looking at the Keokuk dam and power plant. Just in front of you is the lock which the company was required to build so that boats might go up and down stream. You might make a lock from cardboard and show the class how it works. The great turbine wheels which generate the power are placed in the large building which you see at the end of the dam

from the Missouri; Des Moines gets its supply from the gravel beds of the Raccoon. Of what river is the Raccoon a branch? Keokuk, Davenport, and Burlington draw their water supply from the Mississippi. It is necessary to filter the river water carefully before it is used. There are many methods of filtering. A common one is through beds of clean gravel and sand.

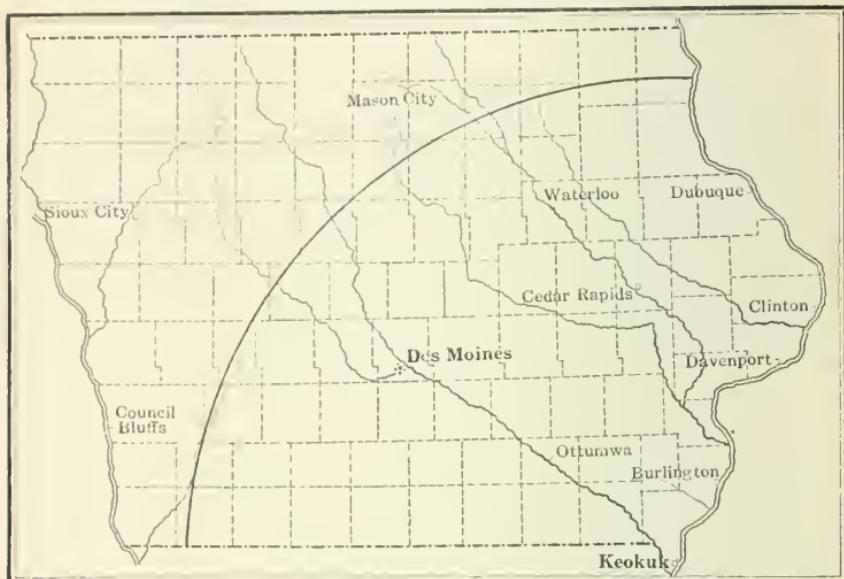


FIG. 24. The curved line on the map shows the extent of the area which can be served by electric power generated at Keokuk

How does the water which is in our wells become filtered? See if you can find out the source of your water supply.

Many Iowa rivers furnish water-power to run mills (Fig. 22). Water-power was used in very early days by the settlers, who needed mills to grind their grain and to cut logs into boards for building. Dams were put in the streams where there were rapids or little falls, and mills were built. There are many flour mills in the state today making use of water-power. Cedar Rapids has a fine hydroelectric plant producing about three thousand horse-power. Electricity from this plant is used in Cedar Rapids, by the interurban railways to Mt. Vernon and Iowa City, and for the lighting of distant towns.

Our finest water-power site is at Keokuk, but we cannot say that it belongs to us alone. Look at the map and decide why. It is owned by the Mississippi River Power Company. The United States government gave them the right to put in the great dam there, but they also had to put in a canal and lock so that boats might go up the river. Have we previously mentioned these rapids? The water which is held back by the dam runs through a narrow passage with great swiftness, and when it falls on the big turbine wheels its force is sufficient to generate three hundred thousand horse-power of electricity. It is said that electricity can profitably be carried two hundred miles. How is it carried? Many places are supplied with electricity from this plant. Some of the power is carried as far as St. Louis. How far is that? Study Fig. 24 and decide whether your town could profitably get electricity from this plant. How does your town get its electricity? Why is water-power preferable to steam-power?

There are still other purposes for which Iowa uses its rivers. What are they?

THE TAMA COUNTY INDIANS

We have already learned that until about 1832 the Indians owned all Iowa and lived in all parts of the state, roaming about as they pleased—hunting, trapping, and fishing. Within a few years they had sold all their land to the United States government. Many Iowa farms sell today for more than \$400 per acre, yet the Indians were paid only from 8 cents to 12 cents per acre for this land!

The Indians agreed with the United States government to move farther west. Really, they did not have much choice in the matter. The Sac and Fox Indians, who lived in the eastern part of the state and with whom one of the first land treaties was made, agreed to move to a reservation chosen for them on the west side of the Missouri River. The authorities chose a place for them in Kansas, but the Indians did not like it, for they said it was good neither for hunting nor farming. Some

of the Indians succeeded in getting together a little money, and in 1856 came back to Iowa and bought a piece of land in Tama County. The Tama County Indians (Fig. 25), commonly called *Musquakies*, are a remnant of the Sacs and Foxes. In what direction is Tama County from your home?



FIG. 25. Three young "braves" from the Tama Indian settlement. You would never know from their dress that they were not boys from your own school

government, and in 1867 their yearly payments were restored. They invested part of this money in land, and in 1905 owned nearly three thousand acres.

Someone, in writing of the movement of the Indians back to Iowa, gives a short description which will help you to know something of their feelings. This quotation will also help you to understand that although we usually think of the Indians as rovers they shared in the home feeling common to us all.

These Indians had money enough to buy only eighty acres of land at first, and for a few years they had a hard time to make a living. Because they would not stay on the reservation which had been chosen for them in Kansas, the government refused to give them their yearly payments. They struggled along for ten years, doing what farming they could, hunting along the river, and selling beadwork. Finally friends among the white men pleaded their cause with the



FIG. 26. This is the home of one of the oldest squaws. You can see plainly the framework which has been put up for a porch. When finished it will be covered with braided grass



FIG. 27. Notice the different types of homes which the Indians at Tama have built. In some cases the heating system is only a pile of sticks on the floor

Their dead were reverently borne from distant places and buried with solemn and impressive ceremonies on the bluff in plain view of their new home, and the warriors of the Musquakies fell on their knees by the graves of their kindred and kissed the earth in gratitude to the Great Spirit for this goodness toward them.

These three hundred and fifty or sixty Musquakie Indians have changed only a little from the customs of their ancestors. See the pictures of some of their homes, or wickiups (Figs. 26, 27). They may not seem very satisfactory to you, but they please their owners. The wickiup is really the winter home, and may be either oval or oblong. Formerly, it was made of slender poles bent into shape and covered with rush matting. These which are shown in the picture are rather poor imitations of the older ones. The wigwam is the Indian's summer lodge. This is often built of bark fastened on the outside of upright posts or poles. There is no chimney, and the smoke passes out of the door or the roof. Instead of the skins of the deer, bear, and buffalo, which the Indians once used for their beds, they now use mats and blankets of their own weaving.

The Indians have changed their style of clothing, too, in accordance with their needs and what they can obtain. About two hundred of them wear citizens' clothing. The older men and women still wear blankets just as their ancestors did hundreds of years before them. In foods they have substituted pork for venison, and wheat flour is largely substituted for corn meal. Yet when the time comes for weddings and burials and the solemn religious festivals of the tribe, they wear garments and ornaments made by the Indian women, and prepare their feasts in the old way and serve them in the old vessels which their ancestors used. In general, their ways of living are not sanitary, and hundreds of them fall victims to tuberculosis.

You will be interested in some of the names taken from the records at Tama: "Na na wa chi," "Hoki ma kwa wa," "Cha ko so," "Pi ta to kwa." The first two are names of women, the other two of men. Some of them have English names also, as, "Frank Earl." The Tama settlement has a school and a sanatorium.

IOWA'S CAPITAL

When we speak of the present capital of Iowa we mean Des Moines, but this has not always been the capital. When Iowa was first organized as a territory in 1838 the first legislature met at Burlington. What is a legislature? A commission was appointed to select a site farther west for the capital. Why



FIG. 28. The old State Capitol is now one of the buildings of the State University of Iowa. Of what material is this built?

was it better to have it farther west? The instructions given this commission were that they were to choose some place in Johnson County. Where is Johnson County? They chose a spot on the banks of the Iowa River and set up a slab marked "City of Iowa." Ten acres were set aside for the Capitol grounds; and streets and parks were laid out. The commissioners even planned wharves along the river at which steamboats were to load. Do you think those wharves are used today? What is the difference between the capital and the Capitol?

The next year the building of the Capitol was commenced. It was built of limestone brought from a quarry a little distance up the Iowa River. Flatboats were used in bringing it down.

A small quantity of stone from other quarries was brought across country with ox teams. If you look at Fig. 28 you will see a picture of this building, which was later given to the State University and is now used by that school as an administration building. Two years later, in 1841, the legislature met in Iowa City. This fact made it a real capital. The building which you have just looked at was not finished at that time, so a substitute had to be used. The legislature met in December. How did the members probably travel to Iowa City?

In 1846 Iowa became a state. For eleven years thereafter Iowa City continued to be the capital of the state, and during this time men were pushing farther west and northwest and settling the prairies. In what section of the state is Iowa City? Only a few years passed before many people thought that the capital ought to be moved to a more central part of the state. Why is it an advantage to have the capital in the central part of the state? From where do the members of the legislature come? What other people need to go to the capital on business? Look at the map (p. 4) and see whether the capitals of some of the other states are centrally located.

The subject of moving the capital was discussed at every meeting of the legislature. Some of the arguments against moving the capital farther west sound rather strange now. Here is a sentence from one speech: "A very large portion of the country lying west of the Des Moines and its tributaries is a barren waste made up of lakes, marshes, and sand hills incapable of being inhabited." How do you think the man who made that speech would feel if he could travel west of the Des Moines River today?

Again a commission was appointed. Here are the orders which were given it:

Examine such parts of the state as seem suitable, select the amount of land appropriated by Congress, and locate the permanent seat of government "as near the geographical center as may be consistent with an eligible and healthful site, the general features of the surrounding country, and the interests of the state generally."

Do you think the place finally chosen met all these requirements? There was plenty of excitement in the state over the question and hundreds of people sent petitions to the legislature in behalf of various locations for the new capital. Oskaloosa and Pella were strong competitors for the honor.

More people seemed to agree on the Raccoon Forks of the Des Moines than on any other place. You remember that



FIG. 29. This is the Capitol—a building which belongs to you. Its gilded dome can be seen for miles. By what other name is the building sometimes called?

What state officers would be found here?

Fort Des Moines had been located there for some time. The first commission had chosen a place called Monroe City. The legislature did not think this a good choice, so they dismissed the commission and appointed a new one, telling them to locate the capital within two miles of the junction of the Des Moines and the Raccoon rivers. (Make a sketch of the place where these two rivers join and draw the circle inside which the capital would have to be.) Immediately all the excitement of the state centered in Des Moines. The people on the east side

of the river wanted the Capitol built there; others were determined that it should be on the west side. Finally, a place on the east side of the river was chosen. The place is so high that the beautiful gilded dome may be seen for miles, especially when it is lighted. The first Capitol was a three-story building built where the Soldiers and Sailors' Monument now stands. In October, 1857, Des Moines officially became the capital, and the officers moved there from Iowa City. We are told that a snowstorm set in while the office equipment was being moved, and the state treasurer's safe, which was very large and heavy, "had to be left on the open prairie for several days and nights, until the storm abated and the ground was frozen sufficiently so that the safe could be carried on a large bobsled. When it arrived in Des Moines it was drawn by ten yoke of oxen."

A gentleman who moved to Des Moines in 1850, seven years before it was made the capital, has told many interesting stories about the place. At that time it had about five hundred and fifty inhabitants, most of whom dwelt in double cabins which were once occupied by the soldiers. There were two rows of these cabins, and two families lived in each cabin. There were also two small hotels, two brick residences, a few frame houses, and several little stores and offices. There was a little brick courthouse in which church was held on Sundays and school on the week days when school was in session. Usually this was only for three months during the winter. Footpaths took the place of streets. "Our dry goods, groceries, flour, and hardware, in short, nearly all our merchantable wares, were brought chiefly with teams and wagons." Describe another way in which these things might have been brought.

"In our entire trip from Davenport to Des Moines there seemed to be among the people but one conviction, and that was that Des Moines had a great future before it." How much has Des Moines grown since then? Has it grown in other ways than in population?

It was soon felt that it was not fitting for so large and prosperous a state to have its official home in so small and inconvenient a building. The present building was commenced in 1873.



FIG. 30. "Westward" is the name of this beautiful painting in the Capitol. If you study it carefully you will find all the figures mentioned in the text. Do you see the buffalo skull in the lower left corner? The artist who painted the picture tells us that the colors used are those which would be seen in the late afternoon. Remember this when you see the original picture in Des Moines. (Photograph by Hostettler, Des Moines)

It took twelve years to complete it. Look carefully at the picture (Fig. 29) to see if you can discover any of the reasons why it took so long. Iowa has a right to be proud of her Capitol. The corner stone was cut from a piece of granite brought from Buchanan County. How was the granite probably brought to Des Moines? This corner stone is seven feet by three by three, so you see it was cut from a large boulder. The stone for the basement came from the quarry at Iowa City near the old Capitol. Marble from many states and many countries will be found in the building: Tennessee, Vermont, New York, Spain, Italy, France, Belgium, Ireland. When you visit the state-house you will find many beautiful pictures and statues, but probably your favorite one will be the great picture called "Westward," painted by Blashfield. This is a famous painting. It is large and is painted in colors, so you can judge from the small picture (Fig. 30) that the original is very beautiful. It represents the pioneers, led by the spirits of Civilization and Enlightenment, conquering by the cultivation of the great West. The picture shows a prairie schooner with four figures floating before it: one holds a shield with the arms of the state of Iowa upon it; one holds a book, symbolizing enlightenment; two others scatter seeds, indicating the change which will come as the prairie is turned into plowed fields.

The Soldiers and Sailors' Monument, which you see in the picture of the Capitol, was erected to commemorate the heroic acts of Iowa soldiers during the Civil War. The state has bought more land to enlarge the Capitol grounds, and this statue can now be so placed that it will be displayed to much better advantage. Can you find the figure of the Goddess of Victory? The granite shaft on which it stands is one hundred and thirteen feet high.

The Allison Monument (see the Frontispiece) is another statue which beautifies the Capitol grounds. It is considered one of the most excellent pieces of statuary in the state. On the front of its pedestal is a portrait of Senator Allison, with the Victory of Knowledge represented at one side and the Victory of Peace at the other. You can see the first of these figures

plainly in the picture at the front of this book. Notice the torch, carried as the symbol of learning. This figure is followed by Legislature, carrying the books of law. Next comes Financial Prosperity, carrying the horn of plenty. What connection has the horn of plenty with Iowa's prosperity? Above all these sits the Republic. Find out why so beautiful a monument is a fitting memorial to Senator Allison.

Let us now find out something more about the capital. Why has it grown to be the largest city in the state? In what way does the fact that a city is the capital help it to grow? What are some of the causes which make cities grow? Look at the coal map (Fig. 5) and the railroad map (Fig. 82) to see if you can discover any reasons. Des Moines has many kinds of manufactures. On page 149 you will find a list of the most important of these manufactures. Can you see any reasons why such manufacturing plants as automobile-tire factories, hosiery mills, and refrigerator plants might do well in Des Moines, even though the raw materials must be shipped in?

Des Moines is the home of great farm journals. Give some reasons for this. Of what use are these papers? Name some of them. Hundreds of conventions are held in Des Moines. Examine the railroad map to see if you can find any explanation for this fact. Des Moines is a great insurance and banking center. It has many other points of interest. It has a park system of about a thousand acres and many beautiful drives. The grounds of the State Fair cover a great area also. At what time of year is the State Fair held? Why is it held at that time?

CHAPTER IV

IOWA'S GREATEST INDUSTRY—AGRICULTURE

In a recent year Iowa farm crops were worth \$822,961,000. That year its manufactures were worth \$462,819,000 and its minerals were worth \$39,108,000. Allow one inch to represent \$100,000,000 and make a graph similar to Fig. 31. How does the farm-crops line compare with the others in length? What does this tell you? Suppose we added to this line the value of all the cattle, hogs, horses, poultry, eggs, and milk sold from the farms, how would the value of the products

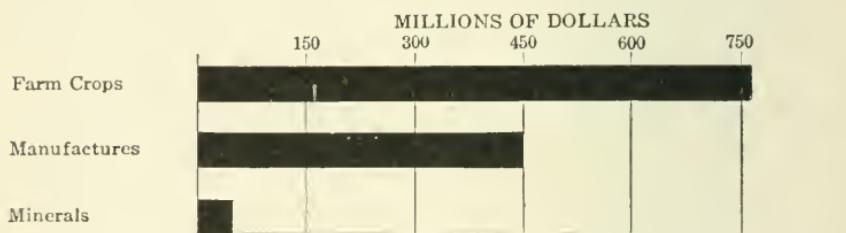


FIG. 31. Graph showing comparative values of Iowa products

of Iowa farms compare with that of its other industries? In Pennsylvania, Massachusetts, and New York other industries are much more important than agriculture. Let us find out why agriculture is so important in Iowa. There are many different reasons.

We have already discussed Iowa soil and found that it is deep, rich, and porous. Few states have better soil, and many have soil not nearly so good. A good soil is one of the best assets that a farmer can have. If the soil is not fertile, is there anything that he can do to improve it? Improving soil is very expensive and cuts down profits. In many eastern states every acre must be fertilized.

Another factor which tends to make Iowa a good farming state is its regular surface. Examine your regional map of the

United States. Look at Iowa and then at the surface of some of the other states. Many of them have waste land in mountains. Mountains make beautiful scenery but poor farm land. Why? Iowa has less waste land in proportion to its area than any other state in the Union. What is its area in square miles (see page 157)? Explain how the ice-sheet helped to level Iowa's surface. In some portions of the southern part of the state the land is hilly and the soil has been washed off the steep hillsides. These conditions make poor fields. What other part of the state is hilly? In the north portion and along the bottom lands of the Mississippi and the Missouri are some farms which are swampy and will need to be drained before they produce large crops. How can this be done? We have already drained many thousands of acres; for instance, there is a stretch of river flat between Muscatine and Burlington which formerly was under water in the spring and summer. Locate this place on the map, p. 52. Dikes were constructed to keep the river out, but the owners did not know how to get rid of the water which came in back of the dikes. Engineers were sent to Holland, where there are many dikes, to learn from the Dutch how to overcome this difficulty. These engineers brought back plans for digging cross ditches into which the water back of the dikes should run. The water in these ditches is then pumped over the dikes into the Mississippi, leaving the land in good condition for raising crops. At one time some of this flat land was not worth \$3 an acre and now it is worth hundreds of dollars per acre. Some of the largest corn yields of the state are to be found on this rich land. Taken all in all there is in Iowa a larger percentage of land which can be cultivated than there is in any other state. This is something for which we should be grateful.

A third thing which makes this a good farming state is the climate. When we speak of the climate of a place we think of its rainfall and its temperature. Iowa has all the rain it needs for raising good crops of grain. We are near enough to the Gulf of Mexico to have an abundance of moisture brought us by the winds which blow over the Gulf. In Iowa rain comes

at the right time of the year; that is, most of it comes in the spring and summer months. Look at Fig. 32 and find out which months have the heaviest rainfall. Some parts of the state of Washington have the same amount of rain that we do, but it falls in winter. Why is spring and summer rainfall better? Where can crops be grown if the rain falls in winter?

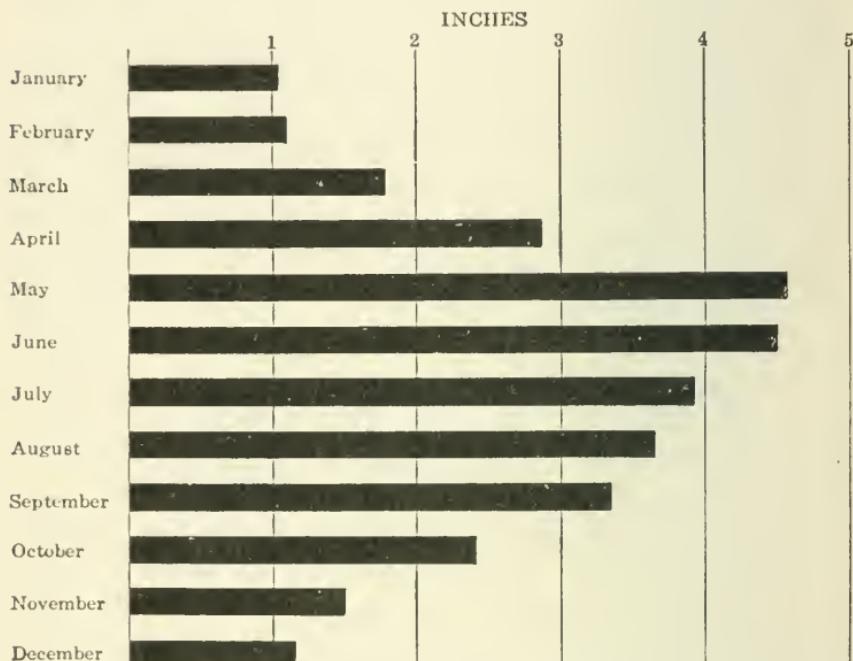


FIG. 32. Graph showing distribution of yearly rainfall by months in Iowa

The average annual rainfall in Iowa is about thirty-one and a half inches. How much sometimes falls in one heavy rain?

If you have never measured to find how much rain falls at one time in your neighborhood, make a rain gauge for yourself out of a straight-sided can (a half-gallon pail which has no rim will do very well). Place it in the yard where it will not be sheltered by trees or a building. After every rain measure the depth of water in the pail with a ruler, empty the pail, and set it ready for the next rain. Keep a record of your work and see how much rain falls in a month. In some one of the towns in your county there is a weather

observer who sends a record to the Iowa Weather and Crop Service in Des Moines every month. Perhaps you can find out from this office what the observer's report is and compare it with yours. Why might his record and yours not exactly agree?

Our long, hot summer days with bright sunshine and warm nights give us ideal conditions for raising corn. We have on the average one hundred and seventy days which are free from frost. Which of our crops ripens latest in the fall?

The Iowa Weather and Crop Service has kept accurate record of our weather for a long period. These government records tell us that the lowest temperature we have had since records have been kept was forty-seven degrees below zero. This was in 1912. The highest summer temperature we ever had, as recorded by a standard thermometer, was one hundred and thirteen degrees above zero in 1901.

You may have heard some of the older settlers say that Iowa's climate has changed much since the early days. They say that the winters were much more severe then, the winds stronger, the snows deeper, and the temperatures lower. The records kept for the past seventy years do not show these statements to be true. There are many things which might have made the weather seem more severe in those days. There were few groves for windbreaks. The settler often stacked his hay out on the prairie and had to bring in loads for his stock even in the coldest days. He had to drive many miles in a wagon over poor roads to town or to the mill. How many hours would it take to go fifteen miles in a sleigh or farm wagon? in an automobile over a good road? Often he had to drive his cattle more than half a mile across the open prairie to some stream and cut the ice in order that the cattle might have water. The houses were poorly heated, and the shelters for stock were poor. All these things made it seem colder in those days, yet the lowest record by an accurate thermometer was in 1912. In your town library see if you can find a copy of the *Palimpsest*¹ for January, 1921, and read in it the story of two boys lost in a blizzard near Mason City.

¹ Iowa State Historical Society, Iowa City, Iowa.

CHAPTER V

OUR CHIEF CROPS

CORN

Now that we have learned why Iowa is a great farming state, let us find why corn is its most important crop. In a recent year Iowa had 10,000,000 acres in corn, 5,670,000 acres in oats,

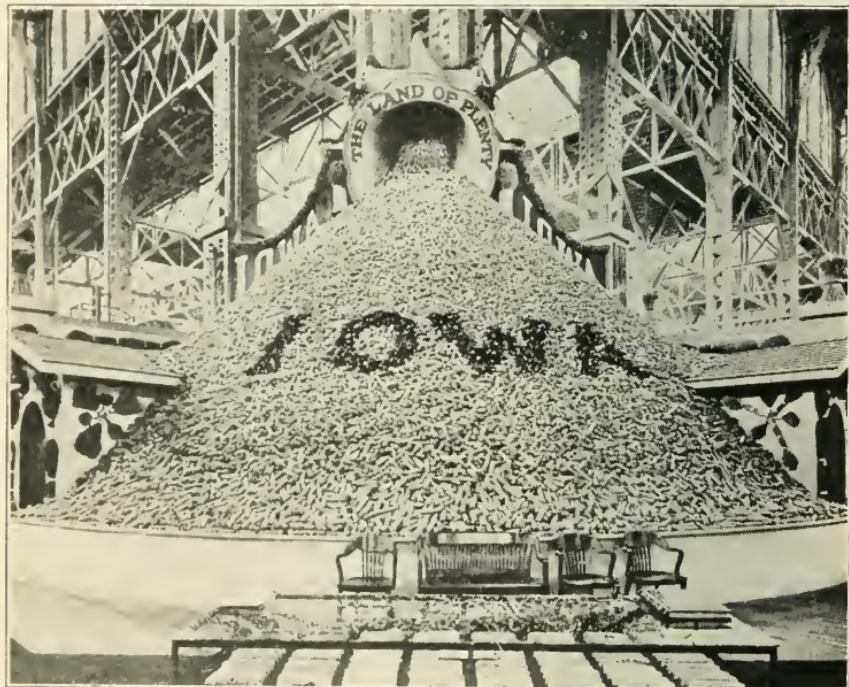


FIG. 33. "The Horn of Plenty" was Iowa's corn display at the San Francisco Exposition. Perhaps you can find someone who saw it there. Iowa won a grand prize for this exhibit

3,470,000 acres in hay, and 1,700,000 acres in wheat. These were the crops to which the farmers gave the most land. Let one inch represent 2,000,000 acres, and make a graph. How

does the line for corn compare with the others? It must pay well to give up so much of our land to corn, or farmers would raise other crops instead. That year all Iowa's farm crops were worth \$950,000,000, while the corn alone was worth \$487,000,000. What part of the total value was corn? North Dakota that year had only 508,000 acres in corn and 7,770,000 acres in wheat. Minnesota plants more land in

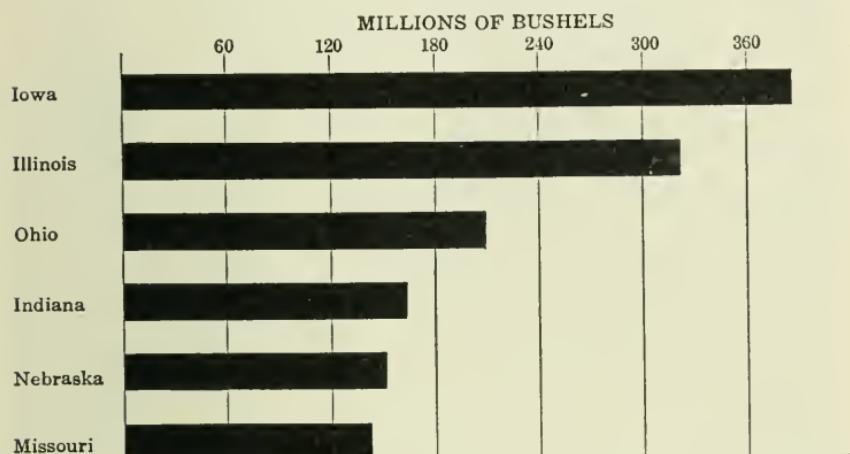


FIG. 34. Graph showing comparative production of the leading corn-raising states

wheat because in that state that crop pays well. Texas, Alabama, and Georgia give a large share of their lands to cotton because their long summers permit them to raise that crop and it pays them well.

Corn requires a rich loam soil—one which is easily cultivated and has plenty of plant food—and an abundance of rain during the growing season. It needs a long, warm summer with warm nights and at least five months free from frost. It grows best where there is some frost just after ripening time. Study this list of conditions and tell why you think Iowa should be a good corn state. Be prepared to prove every claim you make for Iowa. Do you think any state in the Union could be better off in this respect than we are? (See Fig. 33.)

Illinois is the closest rival of Iowa, yet for several years the corn production of Iowa has exceeded that of Illinois

(Fig. 34). At the present time Iowa produces about one eighth of all the corn raised in the United States.

The rose may bloom for England,
The lily for France unfold ;
Ireland may honor the shamrock,
Scotland her thistle bold ;
But the shield of the great Republic,
The glory of the West,
Shall be a stalk of tasseled corn,
The sun's supreme bequest.

PROCTOR

The farmer plows the land for corn either in the fall or in the spring. Can you think of reasons why it might be better to plow it in the fall? After the field has been pulverized and dragged, a corn planter is used to plant the corn in rows. How many kernels of corn are commonly planted in a hill? Some books tell of planting corn by hand. Why is this not done in Iowa? In which month is corn planted? When corn comes up it is carefully cultivated until it is too high for this to be done without injury to the plant. What is the object in cultivating it so much? Where is the flower of the corn plant? Of what use is the silk?

Farmers choose their seed corn very carefully (Fig. 35). Why? If each acre of corn planted in the state could be made to yield five bushels more than it does now, how much would that mean for the whole state? The average yield per acre in the whole state for a period of ten years was thirty-six and a half bushels. In 1920 the state averaged forty-six bushels per acre. This is the best average per acre on record for Iowa. How can the average be increased? What is the average yield in your county?

Let us find out how the farmer disposes of his corn. A part of the crop may be cut while it is still green, then shredded, and put in a silo. Find a picture of a silo. Why do farmers use silos? Why are you especially likely to find one on a dairy farm? Sometimes the silo is filled with the shredded ripened cornstalks. Notice the shredder (Fig. 36). Some of these

machines husk the corn before shredding the stalks (Fig. 60). It is then stored in a crib. Others shred corn ears and corn-stalks. With what other substances are silos sometimes filled?

Much of the corn is husked in the field either by hand or by the use of a husking machine. How much corn can the



FIG. 35. To insure good seed, the farmer selects his corn from the field before frost, stores it properly, and tests it before planting

average man husk by hand in a day? When the stalks are left standing in the field are they of any use? When are the farmers usually through husking?

After the farmer has finished his husking he may have many hundreds of bushels of corn stored in his cribs. If he is fattening hogs or feeding cattle he may need all the corn that he has raised. If he is not going to use it all he may send some of it to the nearest market. Why does he usually shell the corn before marketing it? Are the cobs of any use? Some of our corn goes to states where less corn is produced, and some of it

is sent to European countries to be used for the feeding of stock. How much is corn worth per bushel today?

We have three factories in Iowa which use millions of bushels of corn in making sirups and starch. These factories are located at Cedar Rapids, Clinton, and Keokuk. There are millions of

pounds of corn sirup and corn sugar made yearly in the United States. You probably know corn sirup best in the form of table sirup; it has, however, many other uses. It is used in making candy, preserves, and mincemeats, and also in making shoe polish and in silvering mirrors.

In making corn into sirup the shelled corn is cleaned to take out bits of husk and cob, and then it is soaked in warm water until it is soft.

FIG. 36. This corn shredder blows the shredded stalks into the silo. Of what material is the silo built?

(Courtesy of Iowa State Agricultural College)

The germ is next taken out. Split a kernel of corn carefully and find the germ. When corn is planted, of what special use is the germ? This germ is largely made up of oil. The germ is ground and cooked and the oil is squeezed out. Have you ever used any of this corn oil for cooking in your homes? Some of it is used in making soap. The corn-oil cake which is left is used for feeding cattle.

After the germ has been taken out, the remainder of the kernel is ground fine and run through sieves, which take out the bran. Then the starch and gluten, which make up the inner



part of the grain, have to be separated. Gluten is lighter than starch, so the mass is put into slightly sloping troughs of water, in which the starch settles to the bottom and the gluten flows out with the water at the end of the trough. The gluten is mixed with the bran, then dried and ground and sold as stock food.

The starch is the part in which we are most interested. It is cooked in a water containing some acid. This changes the starch into sugar. The sirup is purified by filtering through bone charcoal. Finally it is boiled until it is thick. Name all the things which this one factory makes. How many of them come back to the farm?

We have not space here to name all the products made from corn, but you may make two lists of corn products: one to contain products from the kernel; the other, products from other parts of the plant.

WHEAT

You have already concluded from the graph you made at the beginning of this chapter that wheat is not an important crop in Iowa. There was a time, long ago, when Iowa ranked second among the wheat-producing states of the United States; Illinois alone ranked higher. That was before Iowa farmers found that it was more profitable to raise corn and feed it to cattle and hogs than it was to raise wheat.

Both spring and winter wheat are grown in Iowa, but in the past few years the proportion of winter wheat has been greatly increased. Winter wheat is sown in September and thus gets the benefit of the fall rains. Find out just how the ground is made ready for wheat and how the wheat is planted. Winter wheat grows in the fall to a height of perhaps two inches. It dies down when the hard frosts come and springs up from the roots when the weather becomes warm in April. If there is very little snow to cover the fields, and thaws are followed by cold weather, winter wheat does not do well, and later the farmer may have to plant some other crop in its place. In a favorable

season the yield may reach thirty-five bushels an acre. Iowa's greatest fields of winter wheat are in the southern part of the state. Can you see any reason for this?

Spring wheat is planted late in March or early in April. It is ready to harvest late in July, about two weeks after the winter wheat has been cut. How is wheat cut? After it

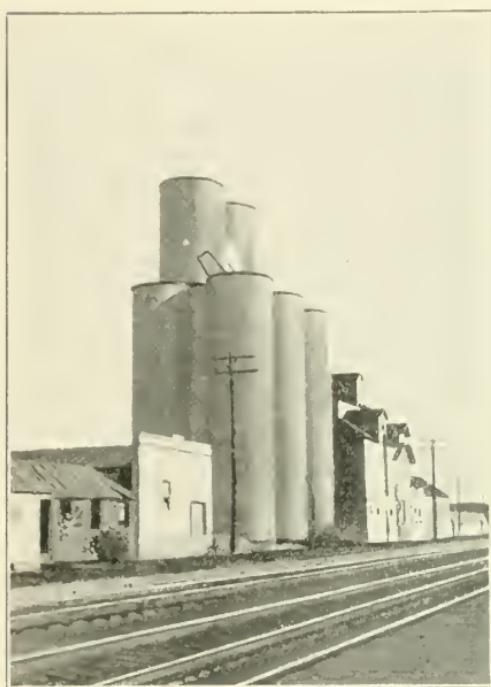


FIG. 37. Have you ever seen one of these elevators being filled with grain? How is the grain loaded from the elevator into cars?

has been shocked, it stands for about two weeks to become thoroughly dry. It is then threshed or stacked. For what is the straw used? The wheat is stored in bins if the farmer expects to keep it for some time, or it may be taken direct to the market (Fig. 37). From the market it goes to the flour mills either in Iowa or in some other state.

Iowa has a great many flour mills (Fig. 38). Find out how many there are in your county and where each is. Are they run by

water-power or by steam? If a bushel of wheat makes twenty-seven pounds of flour, how much flour would be made from the wheat crop given in the table on page 151? If five bushels of wheat per person is the average yearly allowance, how many persons would this crop feed? Would it feed all the people of Iowa for one year? If you could go to one of the mills near your home you might see the wheat weighed and screened and scoured before it is ready for grinding. It is then put through several sets of rough-surfaced steel rollers.

If you should look through a powerful microscope at a grain of wheat which you had cut open, you would find the outer brown coats which make the bran, then a hard, yellowish coat of gluten, and, inside of all, the white starch cells. The gluten and the starch are in the flour, but the bran coats are sifted out.



FIG. 38. This great flour mill in Des Moines can make twelve hundred and fifty barrels of flour in one day. Find out how many bushels of wheat would be needed for this. This mill uses Kansas, Iowa, and Dakota wheat and ships many carloads of flour to the eastern part of the United States

The first sets of rollers which the wheat goes through remove some of the bran and make a little flour. Each set of rollers crushes out a little more flour until all is ground. A fine silk bolting-cloth sieve is used after each grinding to separate the flour from the bran.

For what is bran used? Which breakfast foods are made from wheat? What did we use in place of wheat during the war? Why?

OATS

If some grains of wheat, barley, and oats were placed before you could you tell which was which? If you saw ripened fields of each of these grains could you properly name them? In a recent year Iowa raised 5,670,000 acres of oats. The average yield was 34.6 bushels per acre. What was the total



FIG. 30. This is one of the large oatmeal mills in Cedar Rapids. Oatmeal is only one of many cereal foods manufactured in Cedar Rapids. Perhaps you can find out what the others are

yield in bushels? The average price was 64 cents a bushel. At this rate, what was the value of the total crop? For what is oat straw used? The United States leads the world in the production of oats, and Iowa is the leading oat-producing state in the country. Every county in the state grows oats. Much of the grain is fed to stock on the farm. To what stock is it fed? Some is sold to other states for stock-feeding, and some to Iowa's oatmeal mills (Fig. 39). Cedar Rapids has two factories which are known all over the country. One plant uses 20,000,000 bushels of oats each year. Some of the oatmeal made in Cedar Rapids is sent to foreign countries. Have you used oatmeal made in Cedar Rapids?

OTHER FARM PRODUCTS

We have seen that corn, oats, and wheat are the farmer's most important grains, but he has other crops. Barley is raised in all parts of the state. For what is it used? If you lived in some of the countries of Europe you might have to eat barley bread. We used it in war times, but we prefer wheat



FIG. 40. These hogs are feeding on alfalfa. Corn and alfalfa make a suitable mixed ration for feeding

flour. Perhaps you have eaten the pearl barley, which is used in soups. From the table on page 151 compare the acreage and value of barley with other farm products of Iowa.

Iowa has more acres in hay than in wheat, and thousands of acres in alfalfa and pasturage. Why are these crops so important (Fig. 40)? How does alfalfa differ from clover in appearance?

Iowa produces some buckwheat, and a few thousand acres of flax to make the linseed oil used in painting our houses. Have you seen either of these crops growing in your part of the state? One of them has a beautiful blue flower. Which is it?

Iowa is a good potato-growing state, but we rank much lower than the states farther north—such states as Maine, New York, Michigan, Wisconsin, and Minnesota. Potatoes are such a common crop that it is hard for us to realize that they were once grown as curiosities in flower gardens. The potato was discovered in western South America by early explorers. Some potatoes were taken to Virginia and later from there to Ireland. Why are they now called Irish potatoes? The part of the potato plant which you eat is the underground stem. If you look carefully in a potato field you may find the potato fruit; it is a small, round, purple seed ball.

More than \$500,000,000 worth of sugar beets are raised annually in Iowa. We shall find out a little later what is done with them.

Make a list of Iowa farm crops not mentioned in this text.

When we think of certain states we invariably connect them with great fruit-growing industries. For instance, California, with oranges; Michigan, with peaches; New York, with grapes; and Washington, with apples. Iowa has no such distinctive fruit-growing industry, yet on the whole it produces a large variety and a creditable amount of fruit. Make a list of the different fruits grown in your neighborhood. Add to this list fruits grown in other parts of the state but not near your home. Is this fruit all grown for home use or is some of it shipped?

Iowa harvested nearly two million bushels of apples in 1919. This is not very much in comparison with New York's crop, but it is enough to enable Iowa to rank eighteenth in the apple-producing states of the United States.

In some small fruits—strawberries, for example—Iowa production is heavy. One place in Iowa is famous for the growing of melons and sweet potatoes. It is a tract of sandy soil near Muscatine, part of which is known as Muscatine Island. Watermelons and sweet potatoes and many other garden crops grow well on sandy ground, especially if it is irrigated. Each year more than a thousand carloads of melons, including both cantaloupes and watermelons, are produced there. Two thirds

of these go to the outside markets, as these melons are much in demand on account of their superior quality. More than a thousand acres on Muscatine Island are planted yearly to sweet potatoes. The yield is about a hundred bushels per acre. One part of this tract is especially good for asparagus, and two or three hundred acres of it are grown for local canneries. It is said to be finer than the asparagus grown in California. Cabbages, tomatoes, onions, and cucumbers are also grown here, chiefly for local canning and pickling.

There is a section of country around Osage well known for the growing of fruit and vegetables. Several places in the state grow vegetables for their seeds. Look on seed packages to find the names of these places.

CHAPTER VI

THE LIVE-STOCK INDUSTRY

SWINE

It has been said that most of Iowa's corn "goes to market on the hoof." What does this mean? Iowa raises more hogs than any other two states combined. Look carefully at Fig. 41 and find which are Iowa's closest rivals. By looking

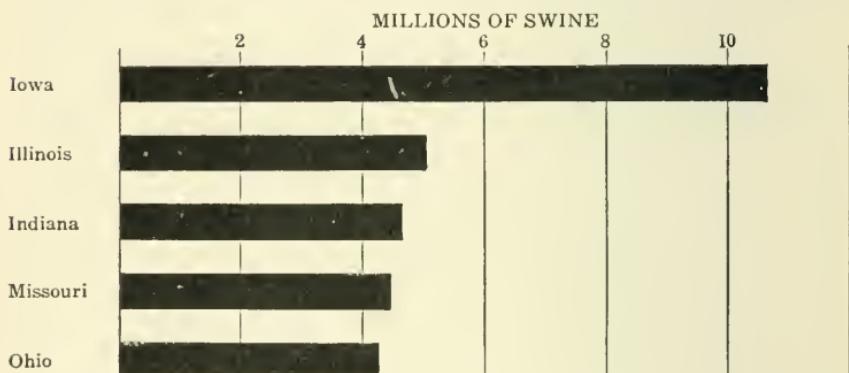
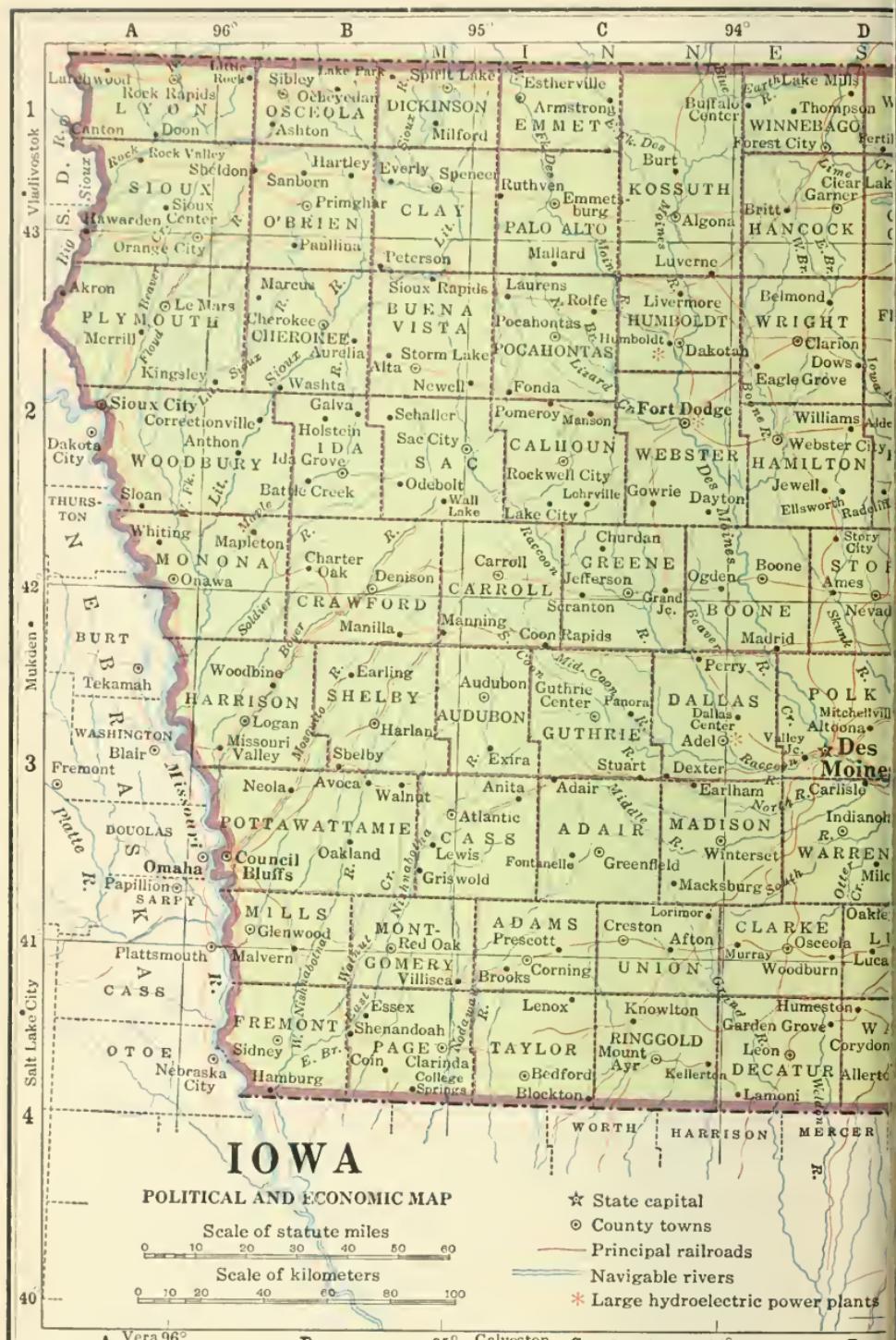


FIG. 41. Graph showing comparative production of the leading swine-raising states

at the graph you will find out what becomes of a large part of the Iowa corn crop. It has been estimated that one third of the whole corn crop of the United States is fed to hogs. Hogs are great corn condensers. The United States produces all the pork and pork products that can be used at home. In addition, in a recent year, more than two and a quarter billion pounds were exported. You may therefore judge that many of the swine which you see on Iowa farms will some day take an ocean voyage. Do you suppose the foreign purchaser will know anything about the state from which the pork he is buying came? Iowa raises a seventh of all the swine raised in the United States.



POLITICAL AND ECONOMIC MAP

Scale of statute miles

Scale of kilometers

A horizontal number line starting at 0 and ending at 100. Major tick marks are labeled at 0, 10, 20, 40, 60, 80, and 100. Minor tick marks are present every 2 units. The number 60 is circled in blue.

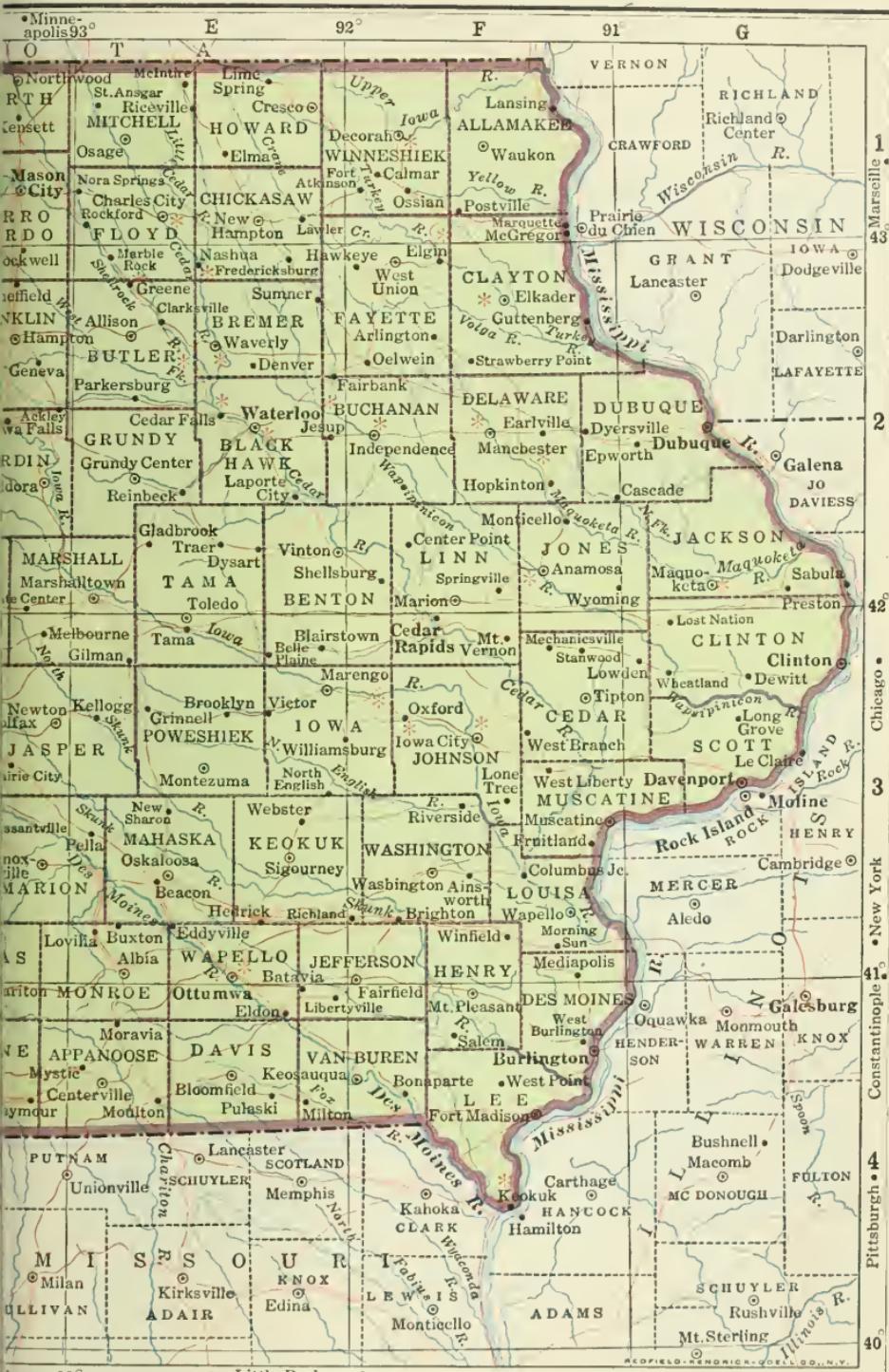
★ State capital

◎ County towns

— Principal railroads

Navigable rivers

Large hydroelectric power plants



Iowa breeders raise both what are called bacon hogs and lard hogs, but many more of the latter (Fig. 42). In other places



FIG. 42. This row of corn cribs explains why the lard type of hog is so profitable in Iowa. Do the farmers in your neighborhood feed all the corn they raise?

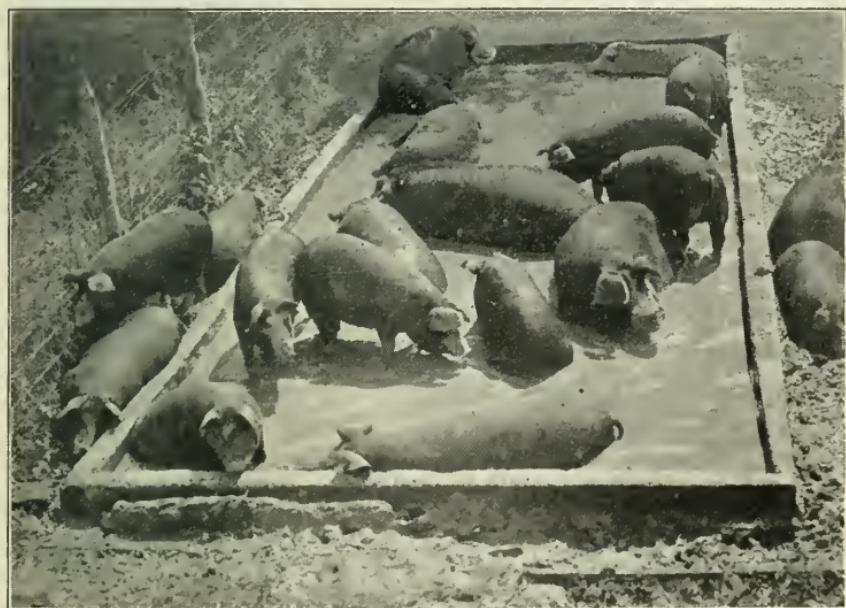


FIG. 43. This concrete hog wallow is filled with water with a coating of crude oil. Iowa farmers take care to keep the skin of their hogs clean and free from insects.

where corn is not so plentiful as it is here, and where more barley and green fodder are used, more bacon hogs are raised.

It is easy to fatten hogs on corn, so it is more profitable to raise the lard type of hog. If you turn to page 153 you will learn about the differences between these types. In some parts of Europe swine range through the forest and fatten on nuts. In the Philippine Islands they feed on coconuts.

To what place do the farmers near you ship their hogs? Many are shipped from this state to Chicago, which is the chief pork-packing center of the country. Very many of the



FIG. 44. This is the cattle division of the Sioux City stockyards. From what states might these cattle have come? What will the bales of hay be used for? When the cattle are taken from these yards, where will they be sent? You see only the cattle division; what other divisions should you expect to find here?

Iowa railroads terminate in that city. Sioux City is the chief packing center of Iowa. Look at the picture of the stockyards (Fig. 44) and note the scores of small pens in which cattle, hogs, and sheep are placed when they are unloaded from the stock trains. This is Sioux City's largest industry, in which nearly four thousand persons are employed.

Stockyards are busy places. If you ever have a chance to visit one be sure to do so. The managers of most packing-houses are very willing to show visitors through the buildings and explain the work that is being done.

As the stock is unloaded from the cars it is carefully looked over by a United States government inspector to make sure that

none of the animals are diseased and unfit for food. There are several well-known packing firms in the Sioux City yards. Each firm has its own buyers. They know where to find each carload of cattle, hogs, and sheep as it is received. When the purchase is completed the stock is turned over to the proper slaughter house.

If the hogs are to be slaughtered at once they are driven to the proper building. There are many mechanical devices designed to save time in each process in the slaughtering and packing houses. After the slaughtering, the carcass is quickly passed through a tank of hot water and the bristles are scraped off by machinery. The skins might be used for certain kinds of leather, but the meat will not keep well after the skin has been taken off. After the dressing of the carcass is finished, it is taken to a cooling-room, where it hangs for more than twenty-four hours. It is then cut into the pieces which you see in the butcher shops. Some of the meat is salted and some is sold fresh. A great deal of the meat is shipped to the eastern part of our country, where there are many large cities, and some is sent direct to foreign countries. A considerable portion is purchased by the Iowa town markets. It is not impossible that parts of the same hog shipped from a given town may be returned to that same town in the form of fresh or cured meat. Why can the packing-houses do all this work more cheaply than can the farmers? What is a refrigerator car?

CATTLE

Iowa raises cattle for two purposes—for beef and for the dairy. Study Figs. 45 and 46 to see what differences you can find between beef and dairy types of cattle. Fig. 104 shows three different breeds of beef cattle. Which do you think is the best? Why? What breeds of dairy cattle are raised in your neighborhood? Which breed is best for butter? Which gives the greatest amount of milk? Are the dairy herds in your neighborhood tuberculin-tested? Why is it well to have this done? How does Iowa rank as a cattle-producing state?

Many Iowa farmers raise their own herds of beef cattle. Others go to a cattle-shipping center and buy cattle which have been shipped in from the Western states and which are not yet fat enough for slaughter. The farmer then fattens them for market. In what kinds of cars are cattle shipped to the stockyards?

At the stockyards the cattle are inspected and sold in much the same way as the swine. After being slaughtered they are skinned. This is done very carefully, so that no holes are cut in the hides. The hides are sold to the tanneries. What is done to them there? Who buys them from the tanneries? When we have finished this discussion you may write an answer to this question: Suppose a beef animal were shipped from your town to the packing-house, how many different parts of it might come back to you?

As the carcass moves on its overhead pulley down the line of workmen, each does his special piece of work. Between the time when the work of slaughtering is commenced and the time when the carcass is ready to go to the cooling-room, more than a dozen men may have done some work on it, and yet the whole time has been less than half an hour.

Every part is carefully saved. The blood and other parts which can be used for nothing else go to the fertilizer plant; the hoofs are used for glue; gelatin is made from the feet; the horns are used in making combs, buttons, knife handles, and many other things; the bones are used for buttons or knife handles or are ground up into bone meal. For what is this ground bone used? Some of the fat is used to make oleomargarine and some is used in soap-making. What else besides fat is necessary to make soap? The meat itself is sold fresh or is salted or canned. The scraps are used in making canned soups. Look at advertisements of canned meats and soups to find in what form they are put up. Canned meats from the United States are used all over the world.

The Sioux City packing-houses slaughtered more than two million animals in a recent year. Among the great packing-plants of the country those of Sioux City rank sixth. In the



FIG. 45. Eudora, a fine-looking Angus. Compare her blocky, rectangular form with that of the angular Holstein shown below

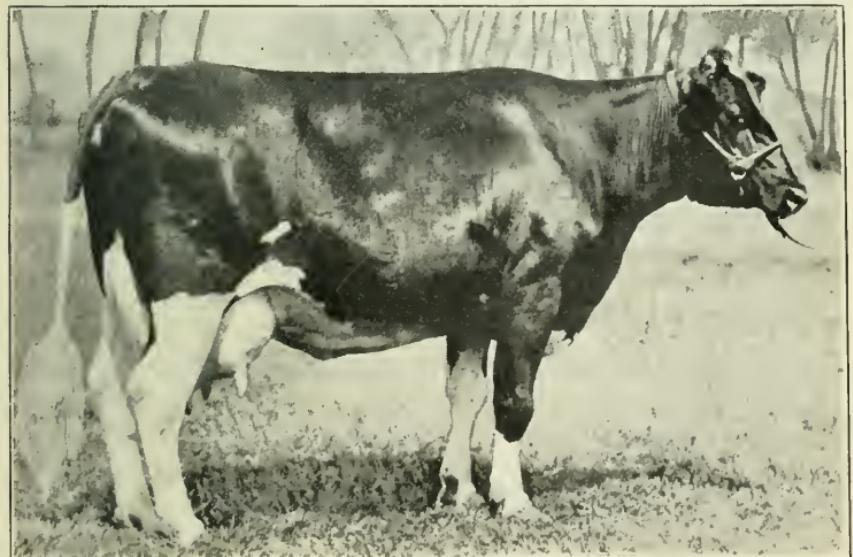


FIG. 46. Ormsby Buffalo Mercedes, whose record for seven days is 648 pounds of milk and 33 pounds of butter. Find similar records for cows near your home

state of Iowa are a number of slaughtering and packing establishments. Among the larger ones are those at Cedar Rapids, Ottumwa, and Waterloo. You can find where others are located by referring to the last chapter of this book. Would it not be a good thing for Iowa if all the meat-producing animals

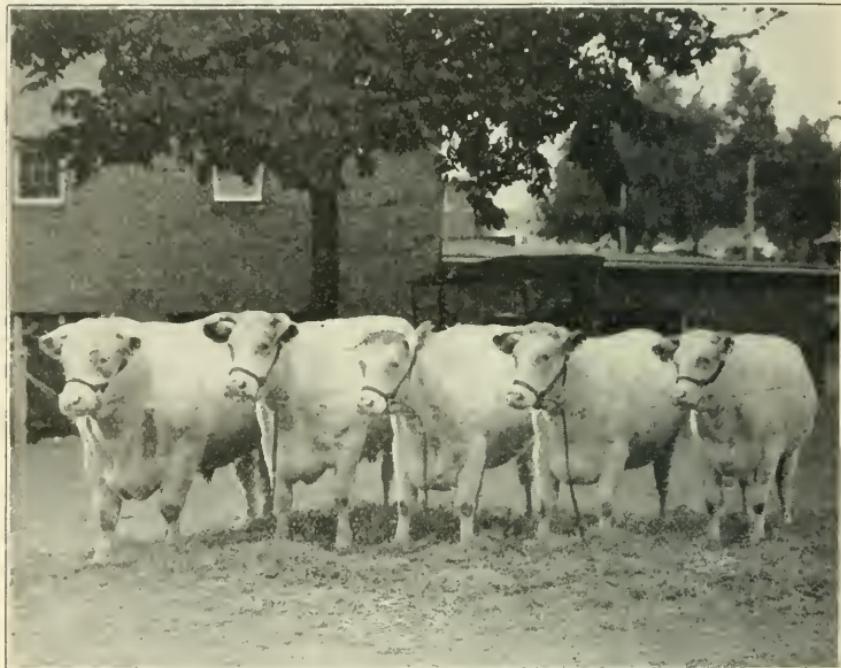


FIG. 47. First Prize Shorthorn Herd. Are these beef or dairy cattle? Are all Shorthorns white? How many different ages are shown in the picture?

we raise could be slaughtered in our own state? It would give employment to thousands of men and build up home industries, besides making the cost of the finished product less by the saving in freight charges.

Now you are ready to answer the question asked at the beginning of the chapter.

SHEEP

Iowa ranks high in the raising of both cattle and swine. Why does it rank so low in sheep-raising? If you had a good Iowa farm and wanted to raise sheep, what part of the farm

should you use for this purpose? Should you give up some of your best corn and oat fields? Should you give your best pasture lands? Could you use some of the swampy places? Give your reasons carefully and decide just what part of the farm you should use, and why. After you have done this explain why Iowa does not raise more sheep. What parts of the United States do you think might profitably raise sheep? Find a list of sheep-raising states and see if your judgment was good.

Nevertheless, in a recent year Iowa raised nearly a million sheep, and fed a third as many more which had been shipped in from other states to fatten. Besides the mutton these sheep yielded more than four million pounds of wool. Of what use are sheepskins?

Following is the report of the state Dairy and Food Commissioner. We shall need to use it again when we study the manufacture of creamery butter. Do not try to remember these figures, but examine the last item in the list and tell why it pays the farmer to keep live stock on his farm if he wishes to raise good crops of grain. In many parts of the United States it is necessary for farmers to pay out hundreds of dollars for fertilizers.

PRODUCTION IN IOWA FROM JULY 1, 1919, TO JULY 1, 1920

Creamery butter (86,219,012 lb.)	\$47,864,453
Ice cream	6,795,943
Market milk	28,875,000
Cheese (790,123 lb.)	197,570
Cottage cheese (2,000,000 lb.)	320,000
Farm dairy butter	10,500,000
Condensed milk	733,521
Skim milk and buttermilk	16,000,000
Fertilizer	<u>30,000,000</u>
Total	\$150,286,448

HORSES

Since Iowa ranks so high in the number of automobiles which it uses, one might think that the number of horses which it raises would be greatly decreased. This is not the case. Today Iowa ranks first among the states in the number of horses it produces (Fig. 48). Why does Iowa continue to raise so many? What breeds are most commonly raised? What are the special needs in Iowa for heavy draft horses? What

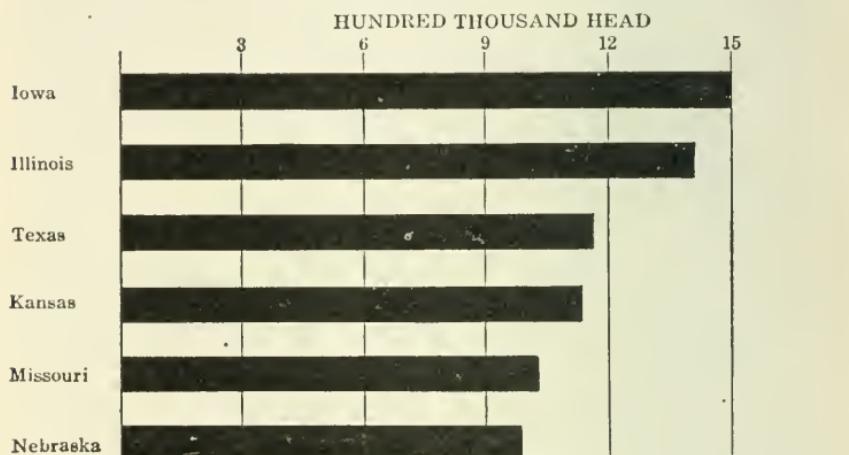


FIG. 48. Graph showing comparative production of horse-raising states

crops are especially adapted to the feeding of horses? Why is it possible for Iowa to export so many of these animals?

Iowa farmers are making great efforts to improve their horses. Many fine ones have been brought here from Belgium, from England, from France, and from Scotland. You can learn more about these in the closing chapter of this book. Notice the picture of Jalap (Fig. 49). So many of the horses of this breed were killed during the war in France—the country from which our Percherons have come—that we shall now have to help in restoring them.

What breed do we get from Scotland? from France? The picture taken in front of the stock-judging building at Ames (Fig. 90) shows you how the agricultural college there is helping Iowa boys to judge horses.

POULTRY

A number of years ago someone wrote, "Every three months the Iowa hen pays for Iowa." He meant that, assuming that Iowa was bought from the Indians at the rate of 8 cents per acre, the eggs laid by our hens in three months would pay for the purchase. When that statement was written the poultry business was not nearly so important as it is now. The Dairy and Food Commissioner's report for a recent year shows that the egg output for the year was worth \$51,000,000. In the closing chapter find the area of Iowa. There are 640 acres in each square mile. Find out how long it would have taken the "Iowa hen to pay for Iowa" that year at the rate the Indians were paid. This may be a hard problem, but it will be fun to work it.

It is said that in the United States

we have eighty-seven varieties of chickens (Fig. 50). Many of these have been brought in from foreign countries—from China, England, Spain, Germany, and many other places. Make a list of all the different kinds which you know. One type may be a better layer than others, while one may grow more rapidly and sooner become fit for broiling. One type may be fairly good for both purposes. Rhode Island Reds, Plymouth Rocks, Wyandottes, and Orpingtons are probably examples of types with which you are most familiar. The



FIG. 49. This is "Jalap," a beautiful Norman Percheron in Black Hawk County. From what country did his ancestors come?

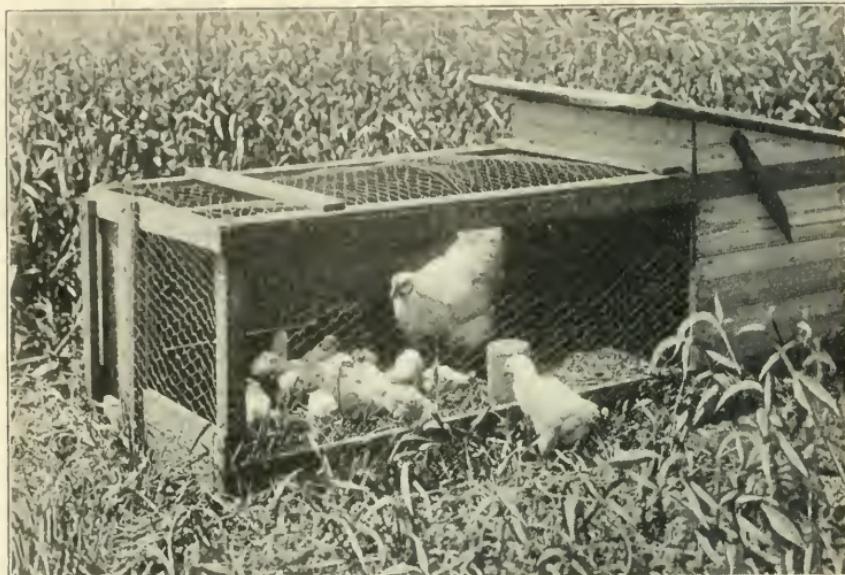


FIG. 50. On what are little chickens fed? How long will they stay with the mother hen? Many chickens are hatched in incubators. (Courtesy of International Harvester Company)

following table gives the average price of eggs in Iowa each month of a certain year. In which months are the highest prices paid? Explain why the price is higher in these months.

January, 56 cents	May, 37 cents	September, 37 cents
February, 45 cents	June, 38 cents	October, 41 cents
March, 30 cents	July, 34 cents	November, 51 cents
April, 34 cents	August, 37 cents	December, 57 cents

Eggs are only a small part of the value of the poultry business. Think of the chickens, the geese, the ducks, and the turkeys sold. The poultry industry is much more valuable to Iowa than many other industries more widely advertised. You may find it interesting now to refer to the table on pages 151 and 152 (Iowa's Source of Wealth).

CHAPTER VII

THE NEW FARMER

Ten or twelve years ago a man from another part of the United States wrote :

To see the new farmer at his best I went to Iowa. No other state has invested so much money in labor-saving machinery, so that it can fairly claim to be the zenith of the farming world. In the main hall of the five-domed Capitol at Des Moines is a life-sized painting of a prairie wagon hauled by oxen. In such a rude conveyance as this most of the early settlers rolled into Iowa at the gait of two miles an hour. But there are no prairie wagons now, nor oxen. Ten thousand miles of railway cross the state and make more profit in three months than all the railways of ancient India made last year. Instead of being tax-ridden serfs, these Iowans pay the total self-governing cost of their commonwealth by handing over the price of the summer's hay. The story of these corn kings is staggering to a mere city dweller, especially to one who has cold-storage ideas about farmers.

When our ancestors "rolled into Iowa" in their prairie wagons they brought with them very simple and primitive machinery. Study carefully Fig. 30 and see some of the articles brought in by the pioneers.

One of the first things the pioneer had to do when he reached the place which he had chosen for his farm was to build a home. His chief tool in this work was the ax. He had probably made much use of his ax on his long journey from the East. When the site for the home was chosen, trees were cut down and the branches trimmed off. The trunks were then cut into logs of the right length for the sides or ends of the house. Some of the logs were cut into slabs to be used for doors and floors. The logs for the walls were notched and bored so that big wooden pins might be used to hold them together. Why were nails not used?

Often the neighbors gathered to help roll up the logs for the new home, for it was heavy work. This was called a house-raising bee. When the logs were laid one on another the chinks between were filled with mud. Look at the picture of

a log cabin still standing in Marion County (Fig. 51). It is much better than many of the cabins in those days. Of what kinds of wood might you expect these cabins in Iowa to be built? Sometimes black walnut was used. Why is it not possible to use it for house-building today?

Most of the cabins were of one story. If there were upper rooms they were reached by a ladder. Window panes were often only pieces of oiled paper; rarely were they made of glass. A great fireplace was always built at one end or side of the room. This served for cooking and heating. The large iron kettle in which much of



FIG. 51. This building is known as the Ruckman Cabin. You will find it today in Marion County. Thousands of Iowa boys and girls lived in just such homes as this in pioneer days. Many of the cabins were not nearly so fine

the cooking was done hung from a crane over the fire. Long-handled frying pans or skillets were used. Why were they long-handled? Find out, if you can, how meats were roasted. Sometimes the cabins were made very cozy and attractive. Skins of wild animals covered the bare floor. What skins might have been used for this? Perhaps someone in your neighborhood can tell you more about these cabins and their furniture.

In the northwestern part of the state some of the first settlers built sod houses. Why did not the settlers in the southeastern part build of this material?

One of the first farm implements needed was the breaking plow, to break up the tough sod of the prairie. On this overturned sod the farmer planted his corn by dropping the kernels in holes cut with an ax or heavy hoe. To keep the crop



FIG. 52. Cradles such as these were used by many Iowa farmers. Perhaps you can find one in your neighborhood. How does it differ from a scythe?

clean after it came up required a good many weary hours of hoeing. This was often the work of the boys in the family. Many plowings were necessary to rid these fields of the lumps of tough sod and make them easy to cultivate.

The farmer, especially in the eastern part of the state and in the river valleys, often fenced his fields with rails. One seldom saw these rail fences in the northwestern part of Iowa. Why?

Wheat, rye, and barley were sown by hand. Explain how the sower carried his seed. The crops could not have been harvested on those rough sod fields with the harvesters of today, even if the farmers had them; but there was no such machinery in Iowa then. To cut the grains in those earliest days a sickle or a scythe was used. What difference is

there between them? The cradle was an improvement on both of these. Look at the picture of a cradle (Fig. 52). It was better because it gathered the grain together so that it was more easily made into bundles. With what were these bundles tied? You may find some man in your neighborhood who has had experience in using a cradle and can tell you about it.



FIG. 53. These three machines are used in making hay. First the grass is cut by the mowing machine shown at the right. Next it is raked into windrows by the rake and then the hay is put on the wagons by the self-loader. (Courtesy of International Harvester Company)

The threshing methods of those days were slow. After the bundles of grain were quite dry they were drawn to a piece of hard, smooth ground and spread out upon it. The grain was then trodden out by driving oxen round and round upon it. You can understand that there was plenty of dirt and chaff mixed in with the grain. This was taken out by throwing the grain up in the air on a windy day. Later, the fanning mill was used for cleaning the grain.

The hay for horses and cattle, their chief food through the winter months, was also cut with scythes and raked up with

wooden rakes. Each neighborhood in those olden days used to make great boast of some champion with the scythe.

We have studied the farmer of the early days and have learned what primitive tools and machinery he had and how much he himself had to do. Now we are ready to study the farmer of today and learn about his many labor-saving



FIG. 54. The tractor takes the place of horses in much of the work on Iowa farms. In this photograph you see a tractor drawing three plows. The arm at the right follows the furrow and thus steers the tractor. (Courtesy of International Harvester Company)

machines. Before you read any further or look at the pictures make a list of all the up-to-date farm machinery you have seen and tell for what each machine is used. Then as you study the next few pages see if the book mentions everything which is on your list.

We have spoken of the primitive way in which the first farmers of the state had to cut their hay. "I can remember when the first mowing-machine was used in our county," said

Honorable A. B. Cummins a few years ago. (Who is Mr. Cummins?) That first mower was rather a rough piece of machinery compared with the one you see in Fig. 53. Notice the width of the swath it cuts. In the center of the picture you see what is known as a side-delivery rake. In another



FIG. 55. Here is a tractor operating a disk harrow. This machine smooths the ground and makes it ready for planting. Notice the large barn and silo in the background. Iowa is noted for its good farm buildings. (Courtesy of International Harvester Company)

type of rake the part which gathers up the hay is lifted and dumped every few feet, leaving the hay in windrows across the field. How many of you have seen hay loaded by hand? At the left of the picture is a hay loader. In what ways is a machine of this kind a great saving to the farmer?

A man no longer uses an ox team when he plows his fields. If he does not use a team of heavy work horses he uses a tractor (Fig. 54). It is said that the number of tractors used in Iowa was doubled in 1920. Can you find out how much

M I N N.

S. D.

N E B R.



RELIEF MAP OF
IOWA
SHOWING AREAS OF THE
FOUR LARGEST CITIES



W.T.Oliver

© Ginn and Company

ground could be plowed in a day by one man if he used a tractor and a three-bottom plow? You have heard that fewer of Iowa's inhabitants live on farms now and that more have moved into towns. Although there are fewer people than formerly on farms larger crops are raised. Do you see how



FIG. 56. This manure spreader was made in Waterloo and is now being used on an Iowa farm. Before spreaders were invented how did farmers spread manure on their fields?

this can be true? This means that more grain is raised with fewer men working in the fields. Why is this desirable?

After the field is plowed the farmer must break up all the clods and have the surface fine and even. This enables the fine tendrils of the roots to get their food more readily, and it also prevents the moisture in the soil from escaping. To put the soil in this condition a disk drawn by a tractor or horses may be used (notice Fig. 55). How many horses are commonly used for this? In what month of the year might this picture have been taken? What evidence do you find in the picture that this farmer raises cattle as well as grain? Why is this advantageous?

When the time comes to sow the grain, a seeder—a long box on wheels—is commonly used. The disk and the harrow are then used to cover the seed and smooth the surface of the ground. Some farmers use a press drill in planting seed. This drill plants the seed in rows and covers it as it is sown. A

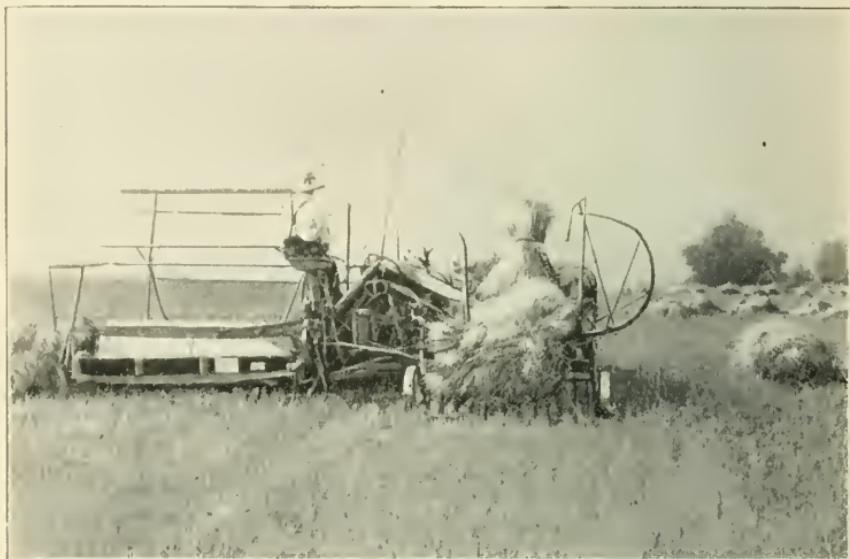


FIG. 57. With the aid of this machine, which cuts, binds, and shocks the grain, one man with a team does the work that formerly required several men and teams. Tractors are often used instead of horses in operating these machines (see Fig. 58). (Courtesy of International Harvester Company)

combined seeder and disk sows the seed, covers it, and pulverizes the surface in one operation. Have you seen one of these?

Many improvements have been made in machinery for harvesting small grains. Fig. 57 shows a McCormick binder and shocker. How wide a swath does it cut? Think of the old cradle and the men binding by hand. Study this picture carefully until you see all the things which the machine does and then read the description on the following page of the first McCormick binder. Cyrus Hall McCormick, who lived in Virginia, invented a practical reaper in 1831. You will remember that this was two years before settlers commenced to come into Iowa.

It was in the fall of 1831 that Cyrus McCormick hitched four horses to his unwieldy machine and clattered out of the barnyard into a field of wheat near by. Horses shied and pranced at the absurd object, which was unlike anything else on the earth. Dogs barked. Small boys yelled. Farmers whose backs were bent from the harvest



FIG. 58. Here you see a tractor drawing two of these useful cutting, binding, and shocking machines. Why is time such an important factor in harvesting? Have you ever seen grainfields as large as these? (Courtesy of International Harvester Company)

labor gazed with contemptuous curiosity at the queer contraption which was expected to cut grain without hands. The field was hilly and the reaper worked badly. It slewed and jolted along, cutting the grain very irregularly. The owner of the field rushed up to McCormick and shouted: "Here! This won't do. Stop your horses! Your machine is rattling the heads off my wheat." "It's a humbug," bawled one of the laborers. "Give me an old cradle yet, boys!" exclaimed a round-shouldered farmer. The owner of another wheatfield invited McCormick to come into it. The ground here was less hilly, and the machine worked better there.

When he arrived home that evening Cyrus thought his troubles were over. He had reaped six acres of wheat in less than half a day,

as much as six men would have done by the old-fashioned method. Although the United States had been established more than fifty years, this was the first grain that had ever been cut by machinery.¹

It took ten long years of labor before McCormick was able to convince others that it was profitable to buy his reaper. Finally he sold two at \$100 apiece. The reaper might never have been perfected if McCormick had always stayed in Virginia. When he came out to the prairies of Illinois, with their level surfaces and large fields, and saw acres of wheat rotting because the hand labor could not harvest quickly enough, he redoubled his efforts to make his reaper a success. This machine did not bind the grain, but simply cut it, after which it had to be gathered into bundles by hand. A little later, machines were invented which both cut the grain and gathered it into bundles, which were tied by hand.

The first self-binders tied the bundles with wire. The farmers did not like this. Can you think why they might not? You should be able to think of a number of reasons. What is straw used for? It is only about forty years since the first binder which tied the bundles with twine was used. You should be able to find men who have used these older machines. A number of improvements have been made in them since self-binders first came into use. Fig. 58 shows a tractor pulling two self-binders and shockers. This saves the work of how many men? Why is grain shocked? How long does grain stand in the shock? This book has told you how the pioneers threshed their grain. Look at the picture of the thresher run by a tractor (Fig. 59). What becomes of the dust and chaff? In some parts of the country combined headers and threshers are used. Iowa grainfields, however, are seldom large enough to make the use of this machine profitable.

The labor-saving machinery employed in corn production is just as interesting as that which we have just studied. Have you ever seen a corn planter with a check-rower? How are the

¹ If you want to learn more of this story, you will find it in "The Romance of the Reaper," by Herbert Casson.

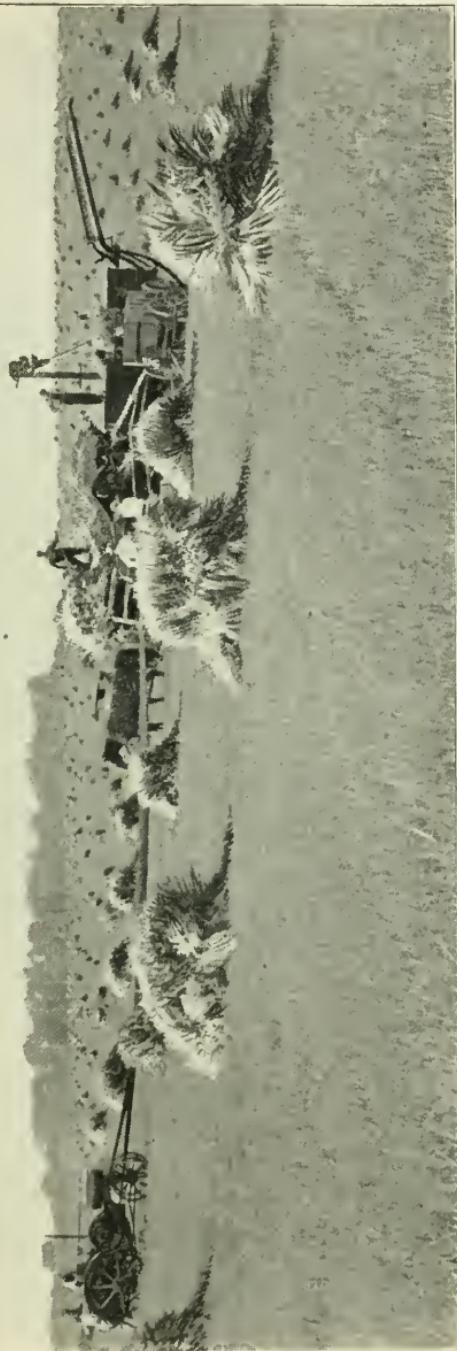


FIG. 59. This is a typical view of an Iowa grainfield. The farmers are about to commence threshing. A tractor furnishes the power to run the threshing machine. Notice how close together the shocks stand. Why is this? (Courtesy of International Harvester Company)

kernels made to drop at even intervals? Formerly, when corn was ripe the farmer husked the ears by hand and stored them in the corncrib. Now much of his corn may be harvested long before the corn is ripe. The silos which we see on most good farms are often filled with green corn. Either green or ripe corn may be used for silage. In Fig. 60 you see a husker and



FIG. 60. A combined husker and shredder. Is this corn ripe or green? Give two proofs for your answer. (Courtesy of Iowa State Agricultural College)

shredder at work. Notice that the dry shredded stocks are being put into the feed barn. The ears are taken to the crib. In Fig. 36 a cement silo is being filled. How is the shredded corn carried to the top of the high silo? If green corn is to be used, the stalks are usually cut with a corn binder, loaded by hand on a wagon, and hauled to the silo to be shredded. There is also a new machine which shreds the corn in the field and loads the shredded stalks into a wagon box. This saves the farmer hard work in loading and unloading the heavy green stalks by hand. Corn is usually planted in hills. How is it sometimes planted when it is intended for silo use only?

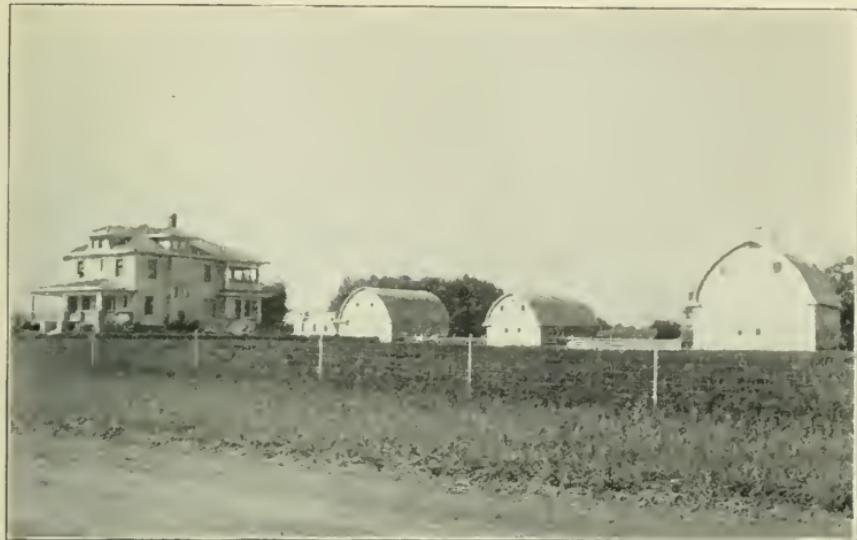


FIG. 61. This farm has buildings which any farmer might be proud of. Select the barn, hog house, crib, and chicken house. (Photograph by Charles Brocke)



FIG. 62. What do you consider the good features of this modern hog house?

You may have seen corn crops harvested in still other ways. In some places husking machines are being used. They are not always satisfactory. Find out why.

Not all the machinery is for outdoor use. There are many labor-saving machines for the farmhouse as well. Make a list of the different kinds of household machinery that you have



FIG. 63. Can you see the elevator which is carrying the material from the wagon up into the barn? You will find much labor-saving machinery on Iowa farms. This enables the farmer not only to do his work without so much hired labor but to live more comfortably. (Courtesy of International Harvester Company)

ever seen. You can find near the close of the book the names of some towns where many washing machines are made.

Modern farm buildings and fine farmhouses abound in Iowa. Are there many in your locality as comfortable and beautiful as those pictured in this book? (See Figs. 61 and 62.)

The "new farmer" tries constantly to improve his farm. He attends county and state fairs to see displays of the newest machinery and the finest stock and the finest farm products (Figs. 64, 65). From the State Agricultural College he gets bulletins telling him what fertilizers to use and how to rotate



FIG. 64. This is a scene at the Clay County Fair. County fairs exhibit the best produce and stock of the county. (Photograph by Frank W. Medlar)



FIG. 65. This is a stock-judging scene at the State Fair. Farmers spend a great deal of money in bringing their cattle to these fairs. What special attention have these cattle probably had before they were exhibited?

his crops to the best advantage. He reads farm papers that he may know what the most progressive farmers are doing. Some of the best-known and most widely circulated farm papers are published in Iowa. Do you know the names of any of these? Who was "Tama Jim" Wilson? What did he do for Iowa? Do you know where you can learn about the duties of the Secretary of Agriculture?

Iowa farm land is very valuable. How much is it worth per acre in your neighborhood? Iowa farms are large. They average one hundred and fifty-eight acres each. This means that thousands of dollars are invested in a single farm. It means also that the farmer today must be a careful business man and a good judge of stock and grain if he is to make his business pay. This is one reason why most Iowa farmers are anxious to have their sons and daughters well educated. Good farmers know that only well-trained men and women can make farming a success.

Write a short essay on "Why I should like to own an Iowa farm."

CHAPTER VIII

IOWA MANUFACTURES

A state as large and prosperous as Iowa must have many other occupations besides farming. As we studied the various farm crops and the different minerals we found that many of them were used in the making of manufactured products. In some states the factories are located chiefly in one part of the state, near coal fields or water-power, or where some particular raw product abounds. The factories of Iowa are scattered throughout the state. More are to be found in the larger cities, yet nearly all towns carry on some kinds of manufacturing. There are a number of reasons why the factories are scattered. These reasons we shall find as we study further.

If we should arrange Iowa manufactures in the order of their importance, the meat-packing industry would head the list. Point out a number of cities in which we have found this industry carried on. Why is meat packed in so many different places and not all in one big center?

The industry of second importance is the making of food products. This includes the preparing and packing of the cereals which are used for breakfast foods and similar products. What does the word *cereal* mean? Look this up in the dictionary. How many different cereals can you name? Which of these cereals are used in making breakfast foods?

We have spoken of the great oatmeal mills in Cedar Rapids (Fig. 39). These mills also make puffed wheat, puffed corn, and puffed rice by shooting grains out of a cannon, exactly as stated in the advertisements. There are a number of factories in the state engaged in the making of food products. Can you think of several reasons for this?

The third large manufacturing industry in Iowa is the making of butter, cheese, and condensed milk. When one special

kind of manufacturing becomes general throughout a state, it is because that region has important advantages for the making of that particular thing. A place may have plenty of raw material, or a good market, or plenty of water-power or coal. Give as many reasons as you can why Iowa can profitably engage in the three kinds of industries spoken of above.



FIG. 66. Are these dairy or beef cattle? Is it a good thing to have some trees in the pasture? (Courtesy of A. O. Harpel)

Why do dairy farmers take such good care of their cows (Fig. 66)? Look at the pictures of a dairy barn (Figs. 67, 68). What do you especially like about them? Notice the large silos (Fig. 68). What are dairy cows fed? Why is not so much corn fed to them as to beef cattle? How is your town supplied with milk? Large cities such as New York and Chicago require so much fresh milk each day that some of it must be brought from a distance of two hundred or more miles in milk trains each morning. Iowa cities are not so large that a sufficient supply may not be obtained close by.

In Iowa much milk is used for the making of butter in creameries. In the year ending July 1, 1920, Iowa cows produced eighty-six million pounds of creamery butter. This was worth about \$48,000,000. Compare this with the value of our coal output in a recent year (p. 10). In 1919 the value of the California orange crop was only \$48,200,000. Add to the

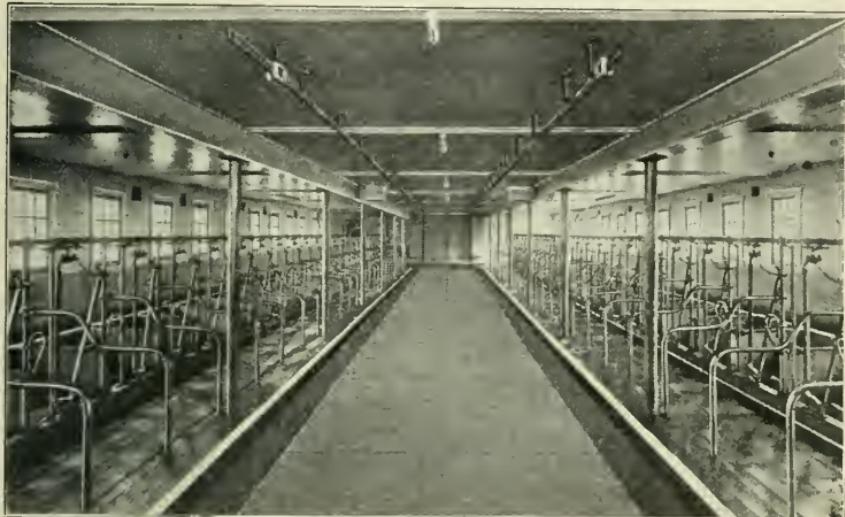


FIG. 67. The view shows one end of the interior of a modern dairy barn on the Dale Meek Dairy Farm in Dallas County. Explain the use of the stanchions. How is the barn lighted? Notice the use of concrete. These fine and sanitary quarters built for valuable dairy cattle show the importance of this industry.

(Photograph by Hostetler)

value of the butter that of all the cheese, the cottage cheese, and the milk that are sold, and then answer this question: Do you think that Iowa's cows are very valuable? The state Dairy and Food Commissioner's figures show that in 1920 the value of the dairy products was \$150,000,000. You will find it very interesting to compare this value with the value of some leading product in other states.

Not many years ago most of the butter made in Iowa was churned in barrel or dasher churning by the farmers' wives. They set the milk in pans or tall cans, skimmed off the cream when it had risen, and churned it. The butter which was not needed

for the home was sold at the nearest town. Later, men went from farm to farm and collected the cream, which they took to a creamery to be churned. This saved a great deal of work on the farms and the butter was much more uniform, but it still took much time to set the milk, skim it, and care for the milk utensils. Besides, the milk was often sour by the time the

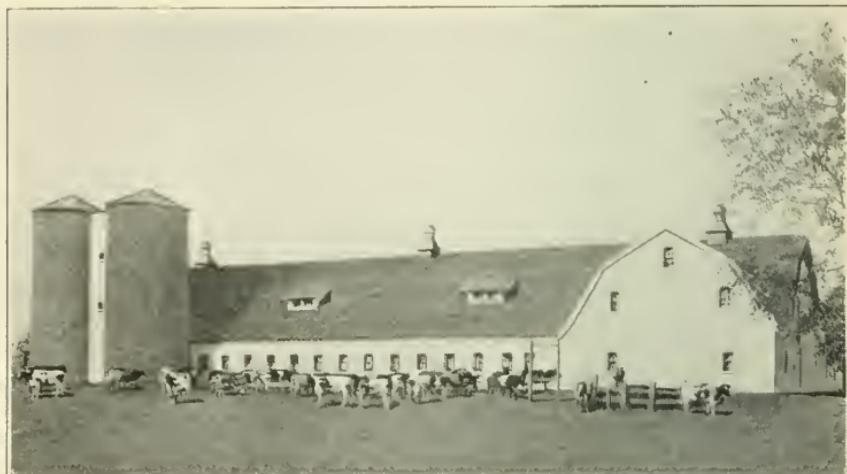


FIG. 68. This is the exterior of the dairy barn shown in Fig. 67. What breed of cattle does the owner keep? Why does he need these enormous silos? (Photograph by Hostetler)

cream was well risen, and the skim milk lost much of its value for feeding to calves or pigs. Are there any uses for sour milk?

Soon another improvement was made. All over the state creameries put in great centrifugal separators, and the farmers took the whole milk to the creamery (Fig. 69). The separator revolved at a high rate of speed, and the cream, which is lighter than the milk, came to the top and was thrown out through a small tube. The farmer then could take the milk back and feed it to his calves and pigs. This method is still used in many parts of the state. In other places the farmer who owns a number of dairy cows has a small separator and does this work at home. This saves carrying a great bulk of milk back and forth each day and makes it possible for the farmer to feed the skim milk while it is still fresh.

This is only the first step in butter-making. The cream is next put into a great churn, which is turned by machinery until the globules of fat separate from the buttermilk. The butter is then worked by a machine to get rid of the buttermilk, washed, salted, and worked again. It may then be made into the pound packages with which you are all familiar or put up in tubs



FIG. 69. This is one of the large creameries of the state. Explain how cream is brought to a creamery. Do creameries buy only cream?

to send to some distant market. Iowa sells a great deal of butter outside the state. Strawberry Point has one of the largest whole-milk creameries known. (In a whole-milk creamery the milk is separated at the creamery.) In one year 470,000 pounds of butter were made at this creamery. Of this, 416,000 pounds were shipped to New York. Iowa has a state brand which may be used when the butter comes up to a certain standard, but only a few creameries have earned the right to use it. Watch for this brand. Do you know of any creameries that have earned this right?

A few years ago a well-known Des Moines man said, "I can remember the time when I walked eight miles through the forest and sold eggs for three cents a dozen and butter for four cents a pound." How much are they worth today?

As our cities grow larger they will need more and more milk to keep them supplied. Does this mean that there will then be less butter made in Iowa? Give reasons for your answer.



FIG. 70. This is an interior view of the iron works at Burlington, where many boilers, tanks, engines, and other kinds of machinery are made

A fourth manufacturing industry is that of the foundry and machine shops. We do not smelt our own iron, but we use so much in the making of farm and railroad machinery that it pays to bring in the pig iron from Chicago or Pittsburgh or other places where it is made. Have you ever seen men gathering scrap iron to sell to the foundries? This is commendable, as it conserves the iron supply and is a source of profit to the one who has been careful not to let his old iron rust away. Iron may be used again and again. What work is done in a foundry? What are castings? Why is Iowa an

especially good state in which to manufacture farm machinery? Make a list of machinery which you know is made in Iowa. This will be a long list, and you may have to work on it for several days, listing the different machines as you recall them. You can find where many of the gasoline engines, dairy separators, tractors, and other useful machines are made by referring to pages 147-151 in the last chapter in this book.

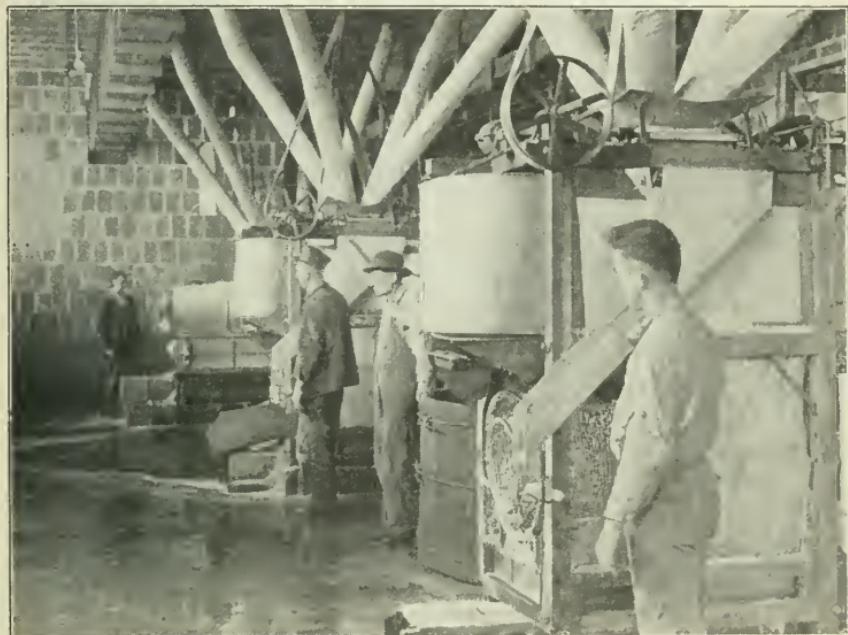


FIG. 71. This is a view inside a sweet-corn canning factory in Polk County. Silking is one of the first steps in the preparation of the corn and is done by the machines you see in this picture. What is the first step? Is it done by hand or by machinery? (Photograph by Hostetler)

There, too, you will find a list of our manufactures in the order of their importance. We shall not discuss them all here, but there are a few in which you will be especially interested. Has your county a factory which does canning or preserving? There are a great many Iowa towns which have such factories. Is your town one of these? Have you ever visited a cannery? Name the chief products of the canneries. Do not overlook pickles, for large quantities of them are made in Iowa. Benton

and Black Hawk counties lead in the canning industry. Locate these counties on the map of Iowa (p. 52).

One of the most interesting places to visit is the sweet-corn cannery. When do the sweet-corn factories run? Just when is the best time to gather sweet corn? Figs. 71, 72, 73 show



FIG. 72. The man at the farther end of this picture is soldering on the lids of the cans, which are then packed in a crate to be placed in the big steam cookers shown in Fig. 73. (Photograph by Hostetler)

certain steps in canning corn. If you have a copy of the Frye-Atwood New Geography, Book One, see pages 98 and 99 and you will find pictures showing other steps. When the corn is brought to the cannery it is husked by one machine and the silk is taken out by another (Fig. 71). Still another machine with sharp knives cuts the corn from the cob, and a sieve sorts out the bits of cob and husk which have worked in. The corn is heated before it is put into the cans, and then the lids are put on. Notice the way in which the cans are packed into great wire baskets, dozens of them at a time (Fig. 72). The baskets are then lowered into the steam cookers, where they remain for

an hour at a temperature of 250 degrees. How many degrees is this above the boiling point? After the cans are taken out they are cooled and tested to see that each can is perfectly sealed. Then they are labeled and are ready for the market. This canned corn is shipped to many far-distant places.

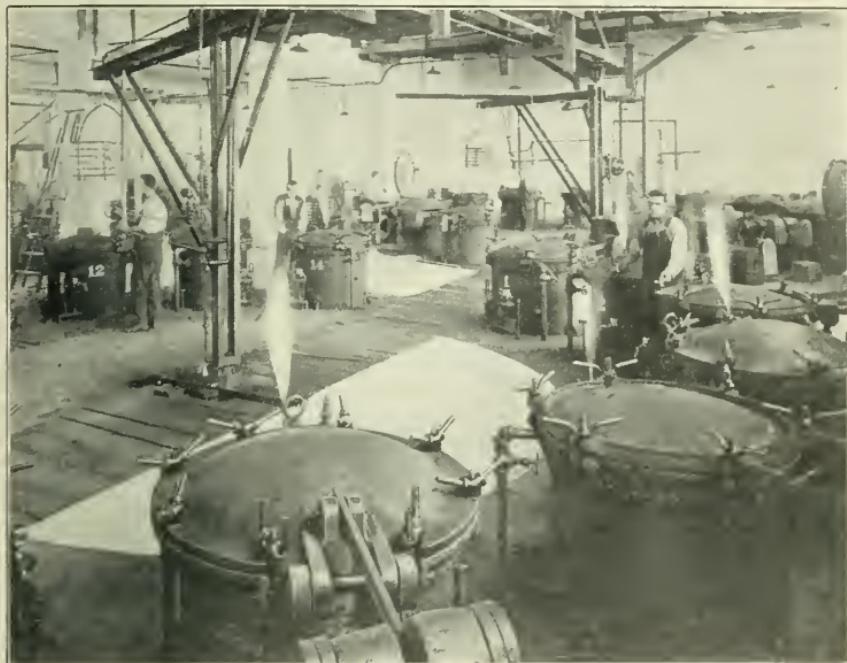


FIG. 73. These are steam-pressure cookers used in canning corn. The cans of corn are placed in these and the corn is cooked for about an hour at a high temperature. Steam-pressure cookers are coming into use in homes. Have you ever seen one designed for such use. (Photograph by Hosteller)

THE CEMENT MILLS

Cement-making is listed as a leading industry. It is a very important one. Do you not use every day something made of cement? This has been called the age of cement. You will find it interesting to make a list of its uses and will be surprised at the great variety of these uses. What is the difference between cement and concrete?

There are two good reasons for making much Portland cement here in Iowa. It is made from a mixture of limestone

and either clay or shale. What is shale? There is in Iowa an abundance of these materials, and at some places, such as Mason City, they are found close together. It would not pay to carry such cheap, heavy things very far to be manufactured. The second reason is that Iowa offers a very fine market for cement products. Much drain tile is needed. This may be made of either clay or cement. In what parts of the state should you expect drain tile to be bought in largest quantities? Cement is used in some of our new, hard-surfaced roads. What is mixed with the cement used for making sidewalks? What is used in building foundations for houses in your neighborhood?

Des Moines has one large cement plant and Mason City has two. At the latter place the material used is the Lime Creek shale and the Cedar Valley limestone. These are quarried, crushed, and dried. They are then mixed in right proportions and put into a rotary kiln. This kiln is one of the inventions which makes cheap cement possible. It is a huge, heated cylinder over fifty feet long and five or six feet in diameter, set up in a slanting position. The mixture which is to make the cement is poured in at the top and slowly slides toward the bottom, drying as it moves through the slowly turning cylinder. The mass of hard, dry material which comes out of the kiln is called clinker and is ground to the fine powder which we call Portland cement. The next time you see it being used, notice how fine it is.

BRICK AND TILE

Give two reasons why brick is a better material for house-building than wood. Why are not more Iowa houses built of brick? In some parts of the United States nearly every house is built of brick or concrete. Clay or shale for brick-making is to be found in all parts of Iowa. Nearly every county has one or more brick yards. How many has yours? We do not need to discuss this industry very fully, since probably you can find out for yourself at first hand how bricks and clay tiles are made.

In the picture shown of the brick and tile plant at Mason City (Fig. 74) you can see the steam shovel loading the clay into the cars. These cars are drawn by horses or mules to the slope at the edge of the pit and then pulled up by cable. Their contents are then dumped into a machine for grinding and pulverizing the clay. The clay is then ready for use.



FIG. 74. Clay is dug from this pit for a large brick and tile company at Mason City. Can you explain how the steam shovel works?

Twenty thousand carloads of clay products are shipped from Mason City each year. These include bricks for building, tiles, and silo tiles. Some farmers prefer tiles made from clay, while others prefer those made from cement. Is Mason City well supplied with railroads to ship out its manufactures?

SUGAR

America's sugar bill is a large one. On the average each person uses about eighty-five pounds a year. Do you think that you use that much? You must include the sugar in candies and ice-creams, jellies and cakes. If each Iowan used the amount

mentioned, how much would it take to supply all the people of the state? (Find the population of Iowa on page 157.)

Sugar is made from sugar cane or sugar beets. We are too far north to raise sugar cane, as it requires many months free from frost. How many frost-free months do we have? We do raise sorghum, which is closely related to sugar cane, but it is only used in the making of molasses. Sugar beets make a sugar which, if properly refined, is just as good for most purposes as that made from sugar cane.

The farmers of Iowa are growing sugar beets and finding it profitable. In 1920 there were three beet-sugar factories in operation. You have probably used some of this beet sugar in your homes and you may have seen some of the beet fields. How does the sugar beet differ from the table beet?

Sugar-beet seeds are planted during the month of May in ground which has been prepared with very great care. The rows of beets are about two and a half or three feet apart. A great deal of hand labor is needed in taking care of the crop. The plants are so tiny at first that they have to be weeded and thinned by hand. Later they require hoeing. In some places Russian immigrants have been brought to Iowa farms to do this work. They have been accustomed to the beet fields at home and are glad to find the same work in this country at so much better wages. The whole family works in the field—men, women, and children.

After the beets are ripe they are harvested, late in October or early in November. A plow is run along beside the rows to loosen the beets, and they are then pulled out. The leaves are cut off and left in the fields or fed to cattle. What purpose will these leaves serve in the fields? The farmer hauls the roots to the factory, if he is near one, but more often to the railroad, where they are loaded on open cars and shipped to a factory. Notice the device for unloading the wagonloads of beet roots (Fig. 75).

At the factories they are stored in sheds until they can be used. You may judge that much storage space is needed, for the smallest of these factories handled about thirty-five

thousand tons of beets in 1920, and the largest nearly three times that many. Fig. 76 shows one of these big factories. Beets yield about ten tons per acre. When they are worth ten dollars per ton what would be the value of an acre of beets? How does the price of sugar affect the price of beets?

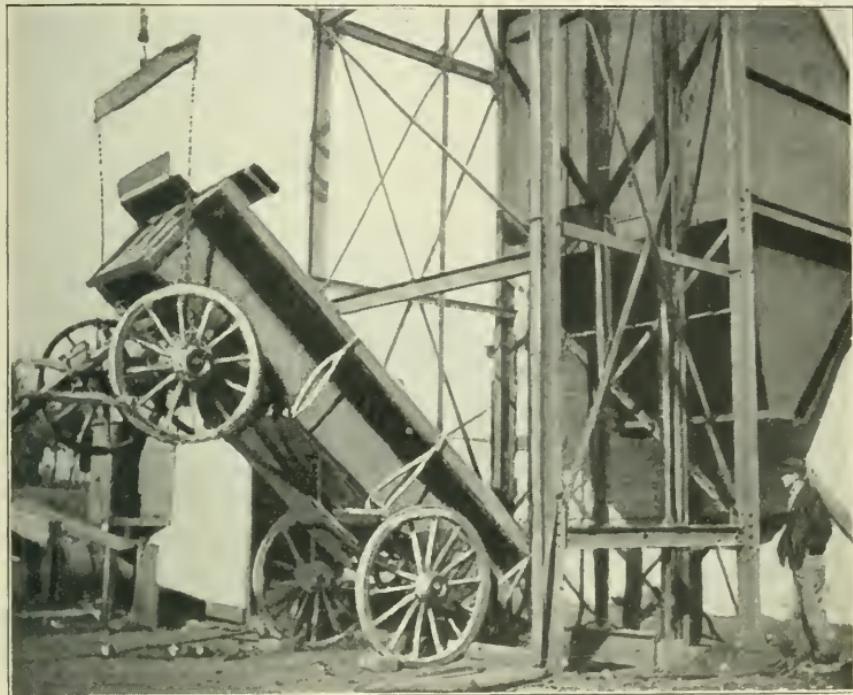


FIG. 75. This load of sugar beets is being dumped by machinery. How is the wagon tipped? The beets will go from the chute into a bin

When the beets are taken from the storage shed to the factory they are thoroughly washed in a big machine with wooden arms which shakes and knocks them about in a large quantity of warm water. They are then cut in small strips and put into a set of pans known as a diffusion battery. These pans are filled with hot water and the sugar is soaked out of the beets. This juice is treated with lime and then with carbonic acid gas, which settles the lime and leaves a clear liquid. This liquid is put through filters, boiled down a little, and filtered again to get rid of the mineral salts which give it a peculiar

taste. After all this has been done it is boiled until the sugar crystals form, just as you sometimes see them form in the candy you are making when you let it boil a little too much. When it has boiled until the sirup is full of crystals, the liquid is put into a centrifugal machine which is much like a cream separator.



FIG. 76. The large beet-sugar factory shown in this picture is located at Mason City. Farmers living many miles away ship beets here by rail. Have you any beet fields in your neighborhood?

When this is revolved very rapidly the sirup is thrown off through a sort of screen in the sides and the sugar stays in the centrifugal machine. The sugar now goes through a drier and slides down a spout to the bags or barrels in which it is to be packed for the market.

The sirup is reboiled to remove any sugar which may be left in it and is then used in the making of stock food. The dried beet pulp is also used for stock food. The lime cake which is used in clarifying the juice is used on fields as a fertilizer.

A beet-sugar factory is a very interesting place. Be sure to visit one if you have an opportunity.

In 1920 one factory produced about 6,500,000 pounds of sugar, another about 12,000,000 pounds, and the third about 18,000,000 pounds. Allowing 85 pounds annually per person, what part of the total population of Iowa would the product of these three factories feed? How many factories like the third one would be needed to supply all the people of Iowa with sugar for one year? That plant, in making the 18,000,000 pounds of sugar, employed 350 persons and ran for one hundred days, day and night. In November, 1920, the first plant produced 100,000 pounds per day. At that rate how long would it have to run in order to furnish each person in Iowa with his average of 85 pounds for the year?

BUTTON FACTORIES

Have you ever rowed on the Iowa, Cedar, or Mississippi rivers in the summer months and watched the clumsy boats of the clam-diggers with their rows of dragging-hooks? Perhaps you wondered how the diggers could make a living in that way. It does seem rather a lazy occupation, but those who work at it make a good living. In 1920 the finest of the clam shells sold for \$90 a ton.

We said at the beginning of the discussion on manufactures that every business in Iowa had some reason for existing. It is easy to see that the pearl-button business is here because the clams are here, but why are the clam shells in our rivers suitable for making buttons? Not many states have this industry. The clam shells that are fit for button-making are found only in rivers whose waters come from limestone regions. What have we already learned about the rocks underlying Iowa? In building their shells the clams use the lime which the river water contains.

There is a very great difference in the shells of the different species. From the thick-pearled shells which the clammers call niggerheads are made the prettiest and most iridescent buttons. These bring the highest prices. There is another kind, called the sand shell, which is the shell used in making pearl-handled

knives. The factories of Iowa use the commoner shells; both kinds are sent to Europe to be manufactured.

There is one exciting thing about clam fishing—one never knows when he may find a valuable pearl. When the clam-digger unloads his clams he builds a fire and heats the mass of them in a great boiler. This makes the shells easy to open. The flesh is taken out and examined to see that it contains no pearl, and is then thrown away. The shells are piled in great heaps to be sold. A few very valuable pearls and many pretty slugs have been found in the fresh-water clams. From where do the real pearls come?

The first pearl-button factory at Muscatine was opened in 1891. There are only about two hundred such factories in the country, forty-five of which are in Iowa. These Iowa factories are nearly all in the Mississippi River towns. Most factories simply punch the blanks or rounds out of the shells and send them to the finishing factory. Some blanks are sent East to be finished. In order that the supply of shells in the Iowa rivers may not be exhausted by too much fishing, the United States government has established a station at Fairport to look after the industry and to help keep the rivers stocked with clams.

So great is the demand for shells in Iowa factories that shells are being shipped to Iowa from points as far south as Alabama.

After the shells have been taken to the factories they are put to soak for some days in great tanks of water to be softened. They are then sent to the blank-makers, who stamp out the rounds from which the buttons are to be fashioned with little tubular saws. The blanks are very irregular in thickness, as the shells are curved and some parts are much thicker than others. Men who work these saws are paid by the gross, and some become so expert at the work that they can make very good wages. How many is a gross? After the blanks have been ground and polished to an even thickness they are sewed on cards, the condition in which you buy them. These button factories employ hundreds of girls as well as many men.

If you look at the list of manufactures in Chapter XI you will find a great many which have not been even mentioned.

CHAPTER IX

TRANSPORTATION

When white men first came into this state they had to make use of the Indian trails in going from one place to another, for there were no roads. These trails were very narrow, hard-beaten tracks made by the ponies as they went single file across the prairies and through the woods. Why did the Indians roam about so much? The trails were so narrow that they were of little use for the wagons of the pioneers, but they did serve to show where the rivers could be forded. What is meant by fording a stream? At what seasons of the year would it be easiest to cross Iowa streams?

Where rivers were too deep to ford, travelers had to be taken across in canoes or small rowboats. About how large is a canoe? This was a very slow proceeding, as the wagons had to be unloaded and taken to pieces. Sometimes there were many wagons in one of these immigrant trains, because people traveled together for company and for safety. Each wagon was loaded with all the family possessions: cooking utensils, bedding, clothes, spinning wheels,—everything they could hope to have in their new homes except the things they could later make for themselves. It often took more than a day to get a train of these wagons across a river like the Iowa. How would the cows and horses get across? Many times the wagons were drawn by oxen. Look at the wagon in the picture called "Westward" (Fig. 30). One can imagine that the children in the party enjoyed coming to streams, for they often had to walk many miles beside the heavily loaded wagons as these were driven across the prairies.

Very soon, however, ferries were put in at the chief crossing places, and the wagons could be driven on these ferry boats and taken across much more easily. Have you ever seen such a

ferry? There are a number of them in Iowa today. Burlington and Dubuque were important crossing places, and ferries were put in there early. At first, flatboats which had to be rowed across were used, but soon a cable was used to draw these flatboats across. Can you tell how this would work? Perhaps



FIG. 77. Find the Waubonsie Trail on the road map on pages 116 and 117. This beautiful winter scene is on that trail in Mills County

some of you could make a small model to show the class. At some places along the Mississippi, men paid the government several hundred dollars a year for permission to run the ferries. When permission was thus obtained no one else could put in a ferry at the same place. How could one afford to pay so much for the ferry right at these places? Why would the cost for this be less on smaller streams?

Many of the settlers chose farms along the banks of streams, where they could keep boats and use the streams as much as

possible for highways. This was not the chief reason for settling on streams, however. You know that in those days Iowa was a prairie region except in the southeastern and eastern parts, though there is no real prairie to be seen in Iowa now. In many parts of the state the only woodlands to be found were along the banks of streams. There were none of the farmers' groves which are now seen in every direction. Where have these come from? Can you imagine what your home region looked like in those days? Describe it. When a pioneer settled on the banks of a stream he found wood for buildings and fuel. Besides these he had shelter from winter storms and a water supply for his family and his stock. The prairie land beyond he broke for his fields.

The small rowboats could easily be used on the rivers and still are so used; but in those days there were also many larger boats, because other means of transportation were so poor. Good-sized steamboats ran up the Iowa River, and up the Cedar River as far as Waterloo, returning with the produce which the farmers had to sell.

For many years traveling was very slow and difficult. Before regular roads were laid out, routes which were used frequently were marked in some way. As early as 1839 there was a great deal of travel to Iowa City. This was a year after we began our own government as the Territory of Iowa, and Iowa City had just been chosen as our capital. Many travelers crossed the river at Dubuque and lost their way on the long stretch across the prairie to Iowa City, so a man was hired to plow a furrow all the way from Dubuque to the capital, as a guide or marker. To do this, he used a breaking plow and five yoke of oxen.

Soon a stage line was running from this new capital to Muscatine. About how many miles was this? Not long after, the stage lines began to carry passengers and mail between important settlements. This was a slow way to get about, for the roads were poor—in some places merely parallel wheel tracks, and in other places often only ruts through the tall grass. In the spring, when rains were heavy, the low places were

mudholes, and in the winter, when snows were deep, the unfortunate passengers and stage drivers had many slow, cold rides.

From that day to this, the roads have been one of our big problems—a problem which has not yet been very well solved, as you will decide when you look at Fig. 78. Iowa has come to realize that the mud blockade costs its farmers millions of dollars, and whatever affects the farmer affects all the rest of us. Give as many reasons as you can think of why this is true.



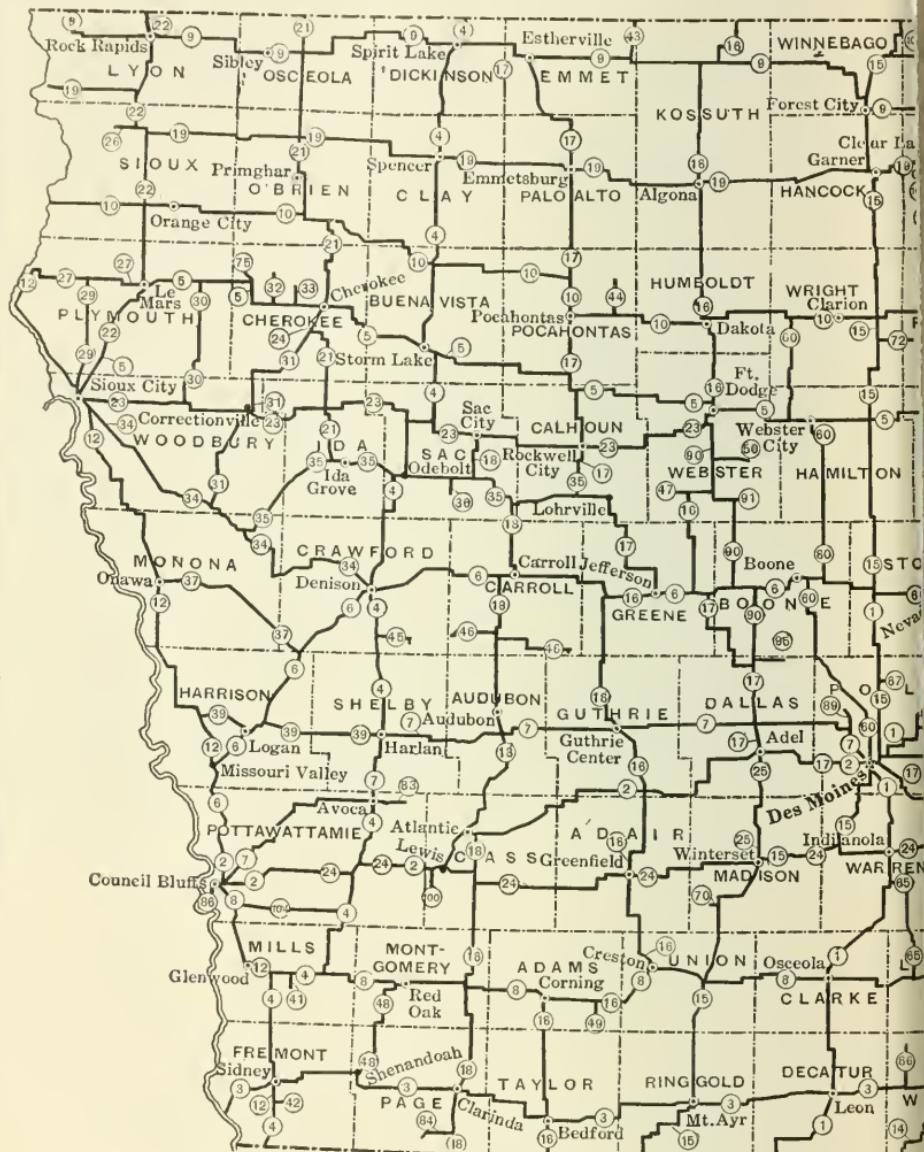
FIG. 78. Thanks to the Good Roads Movement, sights like this are becoming less common each year

Will it pay Iowa to spend large amounts of money on roads? Let us first decide what poor roads cost. Before you answer this question think of all the ways in which poor roads hinder us. Take into consideration the creameries and the necessary carrying of grain, hogs, eggs, and machinery. Remember the merchant in town who wants the things the farmer has to sell. Consider also the mail-carriers, the school-teachers, the school bus, and the doctors. With the coming of the automobile and the motor truck the question of good roads has become one of supreme importance to Iowa. At the present time there are four automobiles in the state for every mile of road.

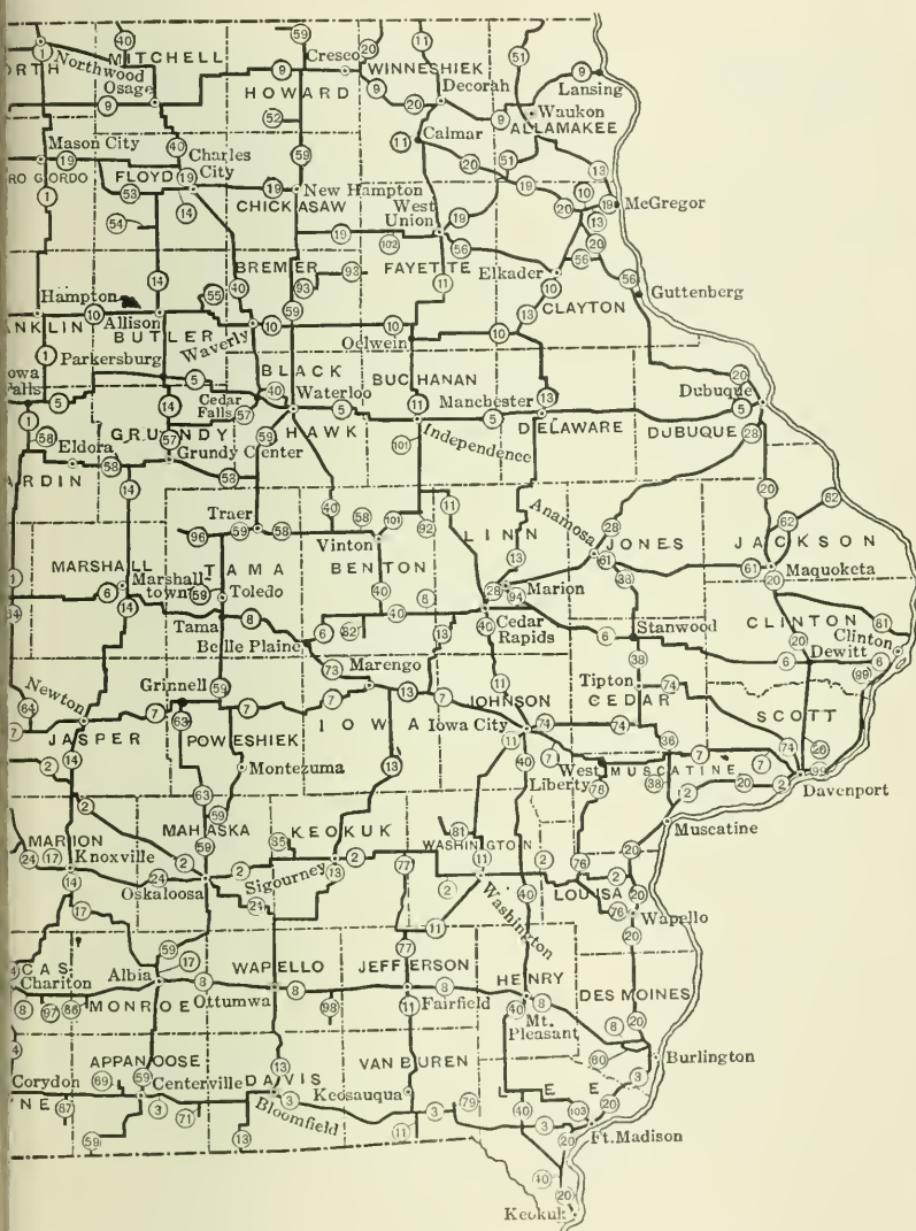
Before we decide where the money is to come from to pay for good roads let us see why our roads are laid out where they are. In the northern and western parts of the state the roads are laid out in checkerboard pattern, following section lines. In the eastern and southern portions they are not so regular. There are two reasons for this: First, the roads in the parts of the state where the earliest settlements were made came before any attempts at surveys had been made and led across country in any direction from one group of people to another. Second, in the southern part of the state the country is very hilly, and the roads often follow ridges because the lower ground was sometimes impassable. In the northeastern part of the state, in Allamakee and Winneshiek counties, what would influence the course of the roads? Look at some of the pictures of this region before you decide (see Figs. 15 and 16). In such counties as Emmet and Palo Alto the surface is so level that roads can easily be laid out to follow section lines. What advantage do you see in this?

The road system of the state includes the primary road system, the county roads, and the township roads. The primary system is under state control. The construction and maintenance of the roads in the county system is entirely under the authority of the boards of supervisors. The construction and maintenance of the roads in the township system are in the hands of the township trustees; but in both the county and township systems all extensive graveling or hard-surface work must be according to standard plans of the state highway department. At the present time the primary road system includes over 6600 miles of roads; the county road system over 10,000 miles; and the township road system over 87,000 miles. Fig. 80 shows a typical gravel road, well made and drained. There were 800 miles of such road in the primary system January 1, 1920, and many miles are being added. Are there any good gravel roads in your neighborhood?

We cannot study all of these roads in detail, but we shall find out what we can about the primary (state) roads, as they are the most important highways in the state. Eighty-five per



IOWA
PRIMARY ROAD SYSTEM



KEY TO THE PRIMARY ROAD SYSTEM OF IOWA

ROAD NO.

1. Jefferson Highway
2. White Pole Route
3. Waubonsie Trail
4. Okoboji Trail
5. Grant Highway
6. Lincoln Highway
7. River-to-River Road
8. Blue Grass Trail
9. Imperial Highway
10. McGregor to Hawarden
11. Minnesota State Line to Missouri
12. South Dakota State Line to Missouri
13. McGregor to Missouri State Line
14. Charles City to Missouri State Line
15. Wilson Highway
16. Daniel Boone Trail
17. Spirit Lake to Albia
18. Sac City to Missouri State Line
19. North Iowa Pike
20. Minnesota State Line to Keokuk
21. Minnesota State Line to Ida Grove
22. Minnesota State Line to Sioux City
23. Hawkeye Cut-Off
24. Ottumwa to Council Bluffs
25. Adel to Winterset
26. From Road No. 22 to Rock Valley
27. Le Mars to Akron
28. Dubuque to Cedar Rapids
29. From Road No. 27 to Sioux City
30. Remsen to Road No. 23
31. Cherokee to Smithland
32. Cleghorn to Road No. 5
33. Meriden to Road No. 5
34. Sioux City to Denison
35. Rockwell City to Mapleton
36. From Road No. 35 to Wall Lake
37. Dunlap to Onawa
38. Anamosa to Muscatine
39. Harlan to Mondamin
40. Red Ball Route
41. From Road No. 8 to Malvern
42. Riverton to Road No. 12
43. Minnesota State Line to Armstrong
44. Rolfe to Road No. 10
45. Manilla to Road No. 4
46. Coon Rapids to Manning
47. From Road No. 16 to Gowrie
48. Red Oak to Shenandoah
49. From Road No. 8 to Lenox
50. Lehigh to Road No. 16
51. Minnesota State Line to Postville
52. From Road No. 59 to Elma
53. Nora Springs to Charles City

ROAD NO.

54. From Road No. 14 to Marble Rock
55. Clarksville to Road No. 10
56. Guttenberg to West Union
57. Cedar Falls to Grundy Center
58. Vinton to Iowa Falls
59. Minnesota State Line to Missouri
60. Goldfield to Des Moines
61. Clinton to Anamosa
62. Bellevue to Maquoketa
63. Grinnell to Oskaloosa
64. Colo to Colfax
65. Indianola to Lucas
66. Humeston to Road No. 3
67. From Road No. 3 to Seymour
68. From Road No. 8 to Melrose
69. Mystic to Road No. 3
70. From Road No. 15 to Macksburg
71. From Road No. 3 to Moulton
72. Dows to Road No. 15
73. Belle Plaine to Marengo
74. Davenport to Iowa City
75. Marcus to Road No. 5
76. West Liberty to Wapello
77. Keota to Fairfield
78. Winfield to Road No. 40
79. Bonaparte to Road No. 3
80. Burlington to Road No. 8
81. Wellman to Road No. 11
82. From Road No. 40 to Blairstown
83. Walnut to Avoca
84. Road No. 18 to College Springs
85. What Cheer to Road No. 2
86. Council Bluffs to Manawa Park
87. Elkhart to Road No. 15
88. Bondurant to Road No. 7
89. Camp Dodge to Road No. 7
90. Fort Dodge to Bouton
91. Dayton to Road No. 90
92. From Road No. 101 to Urbana
93. Sumner to Road No. 59
94. Marion to Road No. 6
95. Woodward to Road No. 90
96. From Road No. 59 to Gladbrook
97. From Road No. 8 to Russell
98. From Road No. 8 to Eldon
99. Clinton to Davenport
100. From Road No. 24 to Griswold
101. Independence to Vinton
102. Hawkeye to Road No. 19
103. Fort Madison to Road No. 40
104. Council Bluffs to Macedonia
105. Lake Mills to St. Ansgar
106. South side of Clear Lake
107. Clear Lake to Thornton

cent of Iowa's population lives either on the line of the primary road system or in towns touched by the system. In general, every county seat in this system has at least one north-and-south and one east-and-west road, and every county-seat town is linked up with every other county seat and the state capital. What is a county seat? What is the county seat in your county? Can you locate on the road map on pages 116 and 117 the roads near your home? See whether they have names (p. 118). How far do you live from these roads? With what places do they connect the county seat of your county?

You will find on the map of the primary road system, just referred to, certain numbers. These road numbers have been established by the State Highway Commission and are regarded as permanent. As far as possible, on interstate roads the same number has been given as appears on the road in adjoining states. Thus it was found that the Jefferson Highway, which extends from the Minnesota line to the Missouri line, was No. 1 in Minnesota, so this number was assigned to the same road in Iowa. The River-to-River Road in Illinois was No. 7, and it became No. 7 in Iowa. The North Iowa Pike, which is No. 19 on the map, is also No. 19 in Wisconsin; and so on. For a fuller explanation of the road numbers on this map study the key on page 118.

The state road officials adopted, besides the numbering system, a standard road-number symbol. The symbol follows the outline of the state of Iowa, with the word "Primary" at the top, the word "Road" at the bottom, and the number of the road in the center—painted in black on a yellow background. To show turns at corners, an arrow bent at right angles points either to the right or to the left turn.

The River-to-River Road, from Davenport to Council Bluffs, through Des Moines, was the original named tourist route in Iowa. It is said that the Lincoln, Jefferson, and Dixie highways all are patterned along the same lines of organization as this once famous River-to-River Road. It is probable that, with the exception of a few of the more important tourist routes—such as the Lincoln Highway, the Jefferson Highway,

and a few others—the use of the road numbers will displace the use of the road names. The names are interesting, however, in connection with the study of the road development in the state. Road No. 2 is also known as the Great White Way. Between what big cities does this road run? Which of the well-known highways have you ridden on?

Now let us find out where the money comes from to keep up these state roads. The primary system of roads is to be improved and maintained entirely with the proceeds of automobile-license fees and money allotted to Iowa by the United States government. This is known as federal-aid money. The funds for primary roads in the 1920 season were \$15,000,000. Eight millions of this came from automobile taxes and seven millions from federal aid. How much do the automobile-license fees amount to in your county? What county officer collects these fees? Is the total amount ever published in your newspaper? The State Highway Commission and the County Board of Supervisors have charge of all the work in this system.

The state law provides that the primary road system shall be divided into patrol districts, and a patrolman or crew be established in each district. At present this patrol work is along maintenance lines only. Have you ever noticed the road patrol going over the roads with a King drag? Why does he do the work after a rain?

Now let us very briefly take up a few points regarding county roads. If the people of a county wish to have the roads hard-surfaced, they vote on the question. What has your county done in this regard? Look at the picture of a concrete road in Linn County (Fig. 79). There are now a good many miles of concrete road in the state. The law provides that one fourth of the cost of construction of a hard-surfaced road shall be paid by the property owners on or near the road. If you owned a farm on a poor road, would you be willing to pay your share for the sake of having it made a good road? Perhaps if you look at Fig. 78 it will help you to decide. How much will it probably cost the man who owns this automobile to get it out

of the mud? Bear in mind the loss of time as well as money spent. Could a heavy load be hauled over this mud road? Have you any road such as this near your home?

The county road system is entirely under the direction of the County Board of Supervisors. Do you know any of these men in your county? The money for these roads comes from the county-road levies. The township roads are under the



FIG. 79. A mile of concrete on the Lincoln Highway a few miles east of Cedar Rapids is shown in this picture. Spring mud will not bother us when we have roads like this. Find the Lincoln Highway on the road map (pp. 116 and 117)

management of the township trustees. Do you know whether you live on a state road, a county road, or a township road?

When you studied about the early lead mines you learned that much of the lead was sold in eastern United States. How was it taken there from Dubuque? This route was much too slow and roundabout when Iowa came to have other things besides lead to ship east. Many of these later shipments were made from points not near the Mississippi River. Some goods were sent by wagon across the prairies of Illinois to the Great Lakes, to be carried east from there by boat. Other goods were shipped down the Mississippi River to the mouth of the Illinois River; thence up the Illinois and through the canal

which connected this river with Lake Michigan. Trace this route. This method was slow and expensive.

Illinois had built about three hundred miles of railroad before Iowa had built any, and Chicago had become an important market. Business men in Iowa saw what advantages there would be in having railroads in Iowa connect with those of



FIG. 80. This gravel road in Greene County is another kind of good road and serves very well where gravel is plentiful. What is done to the road before the gravel is put on?

Illinois. How many of these advantages can you name? What cities lost much of our trade by the building of this railroad?

The first survey for a railroad in Iowa was made in the fall of 1852. December 22, 1852, the Mississippi and Missouri River Railroad Company was formed to build a railroad from Davenport to Council Bluffs. The line from Davenport to Iowa City, a distance of about fifty-four miles, was completed January 1, 1856. How were the engines and cars and material for the railroad carried across the Mississippi River?

A branch from this road went from Wilton to Muscatine. In November, 1855, the first train ran from Davenport to Muscatine, for this part of the road was completed first. Mr. Aurner, in Vol. II of his "Iowa Stories," tells of the great

celebration that was held at Muscatine when this line was completed and of the tables piled high with meats and cakes.

In February, 1853, this railroad company made an agreement with the Railroad Bridge Company of Illinois for the construction of a bridge over the Mississippi River, connecting Rock Island and Davenport. Work on the bridge was started in the fall of 1853, and the bridge was completed on April 21, 1856, a little more than three months after the railroad to Iowa City had been completed.

Another railroad was built westward from Dubuque in 1857. This road, which was called the Dubuque and Pacific, shows how far those who built it hoped some time to extend it. Later it was renamed the Illinois Central. At what city does it reach the Missouri River? At what other points do Iowa railroads cross the Missouri River? At what points do Iowa railroads cross the Mississippi? To what great city in Illinois do most of these roads run? How does this city compare in size with the largest city of Iowa?

Iowa is fortunate in being traversed by six trunk lines of railway: namely, the Chicago and North Western; the Chicago, Rock Island, and Pacific; the Chicago, Milwaukee, and St. Paul; the Illinois Central; the Burlington; and the Chicago and Great Western. In a state so rich in farm products it

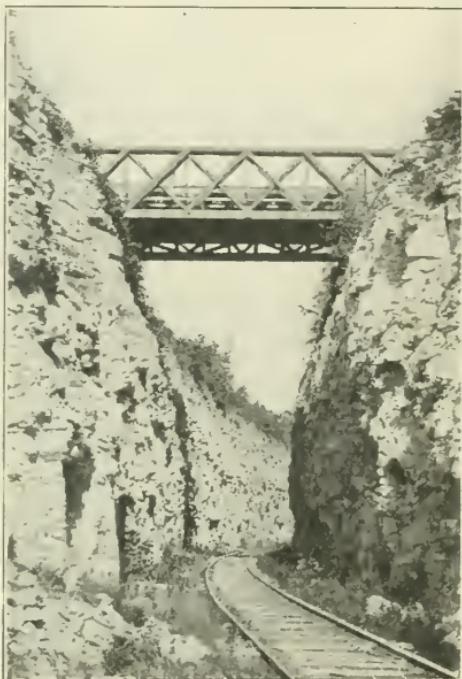


FIG. 31. Cuts for railroads had to be made through solid rock in a very few places in the state. This cut is on the C. M. & St. P. near Fayette. Can you locate this railroad on the map (Fig. 82)?

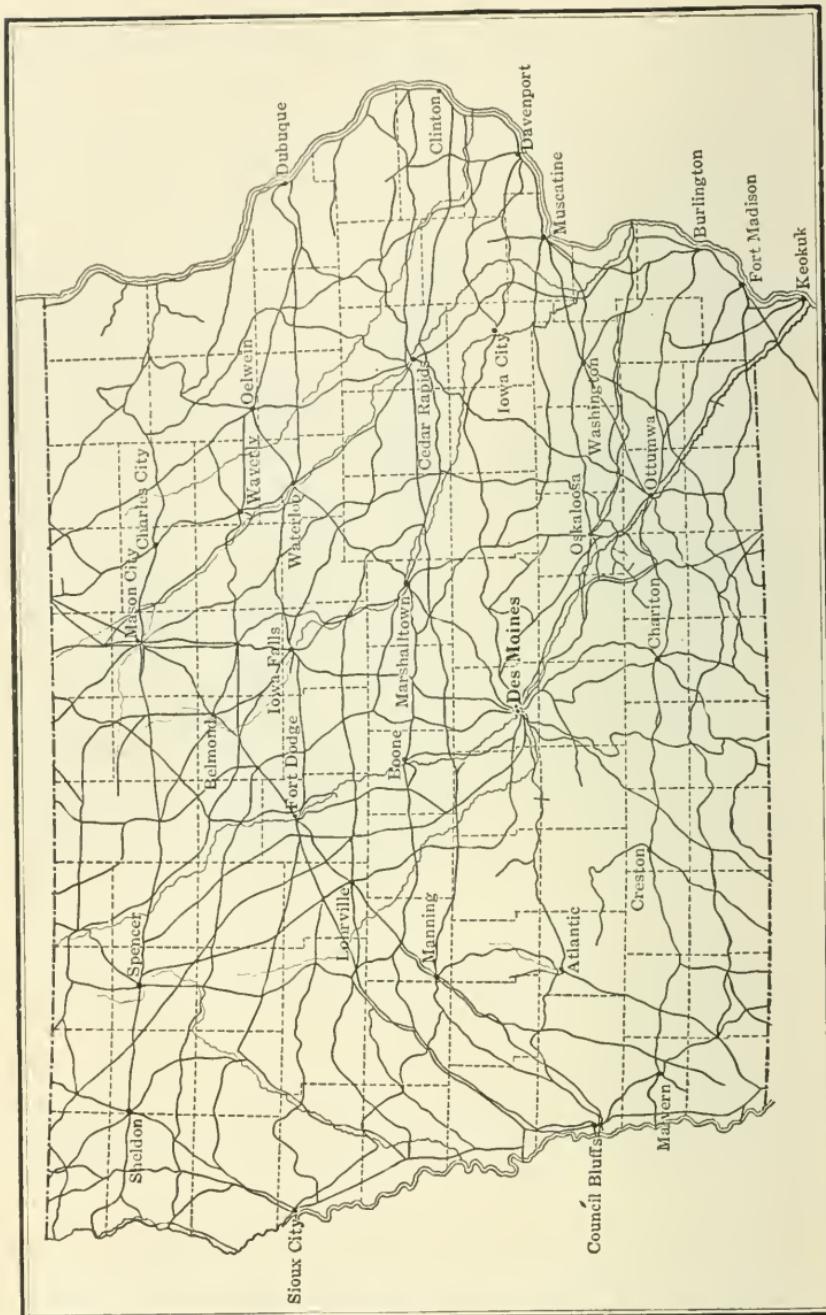


FIG. 82. Railroad map of Iowa

means much to have certain and quick transportation to the great central market of Chicago. It is said that there is no point in Iowa at a greater distance than about twelve miles from a railroad.

Why do so many more Iowa railroads extend east and west than north and south? Iowa has over fourteen thousand miles of railroads today (Fig. 82). How many years is it since the first one was built? Make a list of twenty of the most important products which are shipped from Iowa by rail. Make a similar list of goods shipped into the state by rail. Why has Iowa so many miles of railroads?

CHAPTER X

THE BIRTHRIGHT OF THE CHILDREN OF IOWA

EDUCATION

It is a long step from the humble schoolhouse which was Iowa's first adventure in education to the beautiful school



FIG. 83. This copy of an old print shows what is said to be the first schoolhouse built in Iowa. Describe the inside as you imagine it to have been

buildings which we see today, yet that step has been made in less than ninety-five years. Iowa has advanced until she has the highest per cent of literacy of any state in the Union. Ninety-nine out of every hundred persons can read and write. Why cannot every grown person in the state read?

The little old school in Fig. 83, said to be the oldest school in the state, was called Brush College. It was made of logs



FIG. 84. Many one-room schools were closed in order that the pupils might go to the consolidated school at Tipton. Here are a few of them



FIG. 85. This is a typical consolidated school in Orange Township, Black Hawk County. It is in the open country. No town is near, but the building has every convenience of the well-equipped town school. Make a list of all the advantages which such a school as this has over the one-room country school



FIG. 86. This is the way we used to go to country school on cold winter mornings. Sometimes it was fun, but oh! how cold we were when the mercury was below zero



FIG. 87. This is the way in which the children in hundreds of consolidated schools in Iowa now go to school

chinked with mud, had a dirt floor, oiled paper for windows, and slab seats which were hewn out with axes. Some day when you think you are not very comfortable in school, imagine sitting in those seats.

These first schools were not free; a fee had to be paid for each child. Iowa did not have free schools until 1838. The United States government gave to each state a certain amount



FIG. 88. This building at the University of Iowa is the Hall of Natural Sciences.
What preparation must one have to enter the university?

of land which was to be rented or sold, and the money obtained in this way was to be used for public schools. If we had kept our school land until today we might have had a great deal of money for school purposes, but unfortunately much of it was sold in the early days for less than \$5 per acre. Have you ever heard of the school section in your township? Find out which it is.

In Fig. 84 you see pictures of a number of schools which have been closed in order that the children might be taken to one large, consolidated school. This is what is happening all over the state. There are now about four hundred and thirty consolidated schools (Fig. 85). School officers are coming to Iowa

from other states to see what has been done here in school consolidation. Should you rather recite in a class of fifteen or in a class of one? Write down all the ways in which you think the consolidated schools are better than the one-room schools. Although the one-room schools are being closed, and we are



FIG. 89. Central Building at Iowa College of Agriculture and Mechanics Arts. Iowans do not begrudge money to make this school larger and better, because they know it does so much for our greatest industry. (Courtesy of Iowa State Agricultural College)

glad that better things in education are coming to Iowa, we must remember that many fine teachers have taught in these little schools and that many great men and women have received at least a part of their education there.

Besides the land for the common schools the federal government has given both land and money for the State University, Agricultural College, and Teachers College. The State University was the first of these to be organized (Fig. 88). It was established at Iowa City in 1847, although it did not really



FIG. 90. In this picture a class at Ames is shown studying and judging horses. How does this help the state? (Courtesy of Iowa State Agricultural College)



FIG. 91. This view shows the north end of the campus at the State Teachers College in Cedar Falls. The building in the foreground contains a large auditorium and a number of classrooms and society rooms



FIG. 92. The large library at the Iowa State Teachers College is usually well filled with students

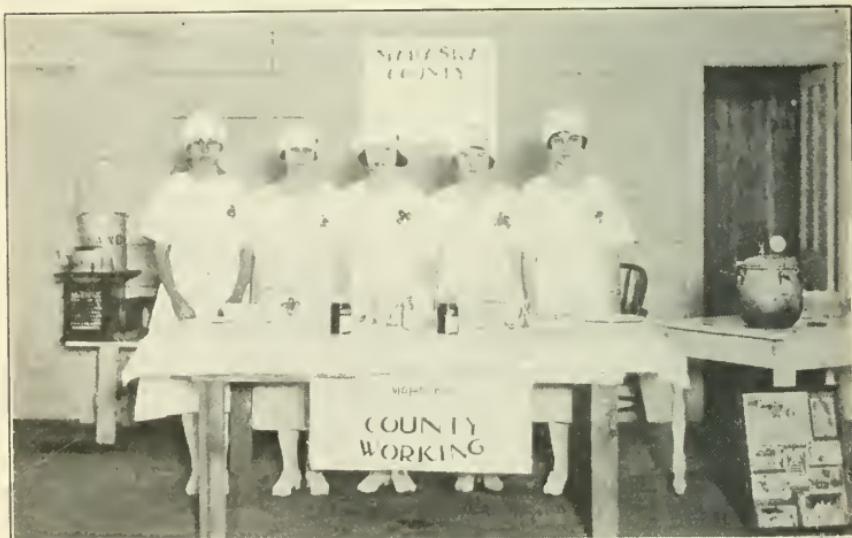


FIG. 93. In addition to the usual studies of the schoolroom many things are taught which will make Iowa farms more profitable. The Iowa cannning clubs are famous. In these clubs girls are taught how to save the products of the farm for winter use. Note the steam-pressure cooker in the picture

begin work until eight years later, for it had no buildings and no money. When the capital was moved to Des Moines the state gave the university the old Capitol building and a part of the land which is now the university campus. So many beautiful buildings have been built on the campus since then that the old Capitol looks small, but when you think of what it has seen and heard you may conclude that it is the most interesting building there (see Fig. 28). What other pictures of university buildings do you find in the book? Is there any difference between a university and a college?

The State College of Agriculture was the next of the state schools to be opened (Fig. 89). This college at Ames has a large and beautiful campus and much farm land. Why does it need this farm land? Find out some of the things which are taught at the College of Agriculture (Fig. 90). An experiment station is maintained there. In what ways does this help the state?

The State Teachers College was first called the State Normal School. It was established at Cedar Falls in 1876. Teachers for all grades of the public schools are trained there (Figs. 91, 92).

Besides these three, which are called institutions of higher learning, the state has a school for the blind at Vinton and one for the deaf at Council Bluffs.

Our school buildings are very different from those of early days, and the subjects taught are different also (Fig. 94). Find



FIG. 94. Just what is this boy doing? What measurements will he take? Why is this work done in Iowa schools? (Courtesy of International Harvester Company)

out from an old settler the subjects which he studied; write them down and compare them with a list of those which you study. There are many other features of the schools of today which were unheard of even twenty years ago. Think of the corn-club and canning-club and baby-beef contests in which Iowa boys and girls have a chance to take part! (See Figs. 93, 95, and 104.) Think of the school gardens and the health



FIG. 95. Boone County boys are shown here judging corn. Could you select the best ears in a bushel of corn? These boys have been trained so carefully in this sort of work that they know immediately what points to look for

crusades and the Red Cross work! You may have heard of vocational and part-time schools which have been organized within the past few years. They are supported partly by the state and partly by the United States. By means of these schools boys and girls who have to go to work before they finish the regular school course are enabled to continue their education, especially in the line of the vocation or industry in which they are interested. In the winter, farm boys have spare time and can enter the classes in agriculture which are established by the director of vocational education in their neighborhoods. In the towns, boys working in factories are given a chance to go into part-time classes during the day or evening.

In 1920 there were more than five hundred thousand persons in Iowa attending school, and the yearly bill for education amounted to \$30,000,000. This bill could easily be paid with the proceeds of the eggs produced in Iowa in a single year. The state is rich and is glad to pay the cost of education, for, after all, Iowa's best crop is good men and women.

Besides the state-supported schools there are many very excellent colleges supported privately or by some religious denomination. Do you know the location of some of these? Thousands of students attend these schools each year.

STATE PARKS AND OTHER BEAUTY SPOTS

A short time ago the children of a certain school in Iowa were writing to the children of a school in Florida. One of the boys wrote, "Tell me something about Florida; there is nothing interesting to write about Iowa." This showed that the Iowa boy had either never traveled in his own state and studied its geography or that he was not clever enough to recognize an interesting thing when he saw it. Which do you think it was? There are a great many people who never see the beautiful and interesting features in their surroundings. Try not to be one of these.

A few years ago Iowa awakened to the knowledge that all its beautiful places had passed into the hands of private individuals, and that there were no places left where people could go to enjoy themselves without trespassing on someone's land. "In 1919 there were not ten acres of public woods, water landings, or open prairies in the state except in cities." A Board of Conservation was appointed by the legislature to see if the most beautiful of these places could not be bought back from their owners, so that the people of Iowa might have some state parks where all would be free to go for recreation and where wild animals and birds would be unmolested.

We have the opportunity to save many fine trees. If these were cut down the soil would wash away, and there would be fewer springs and pretty little glens. It is thought that if these

remaining forest areas are carefully tended, in twenty-five years they will resemble the primitive forests which stood in these same locations fifty years ago. Some of our wild plants are gone forever, just as many of our wild animals are gone, but others still can be saved from destruction. Are some of the wild flowers becoming scarce in your neighborhood? Could you not do something to prevent this?

At the present time the Board of Conservation has chosen about ten areas which have been made or are to be made into state parks. We shall study these briefly, because in these days of automobiles everyone will have a chance sometime to visit several of them, and you will enjoy your visits more if you know something about the places to which you are going. On an outline map of Iowa mark the location of each park as we study it. The maps in the book are not large enough to have these parks marked. When we have finished studying the parks you are to decide whether any of them are near enough for you to visit next summer.

The first state park to be acquired was that known as the Devil's Backbone, twelve miles northwest of Manchester, in Delaware County. It is said to be "the gift of Iowa's sportsmen to the people of the state," because it was paid for from the hunting-license proceeds. Study the picture (Fig. 96) carefully to find some of the things mentioned in the following description. The "Backbone" is a rocky ridge around which the Maquoketa River flows. "Erosion and decay," says Professor Calvin, "have carved the rocks into picturesque columns, towers, castles, battlements, and flying buttresses." What makes rocks decay? What does the decayed rock form? The faces of the cliff are half hidden by trees and creeping vines. You may even find a charming little rock-built room. A spring-fed stream contains trout and bass. In what kinds of streams do trout live?

Another park lies about ten miles southeast of Fort Dodge on the west bank of the Des Moines River. This area has for a long time been known as Boneyard Hollow and Woodman's Hollow. It contains four hundred and fifty acres. What part

of a section is this? The scenery in this park is beautiful, but it has other things of interest to school children. Woodman's Hollow once belonged to a man named Woodman. The opening into the Hollow is narrow. The beauty of the ferns everywhere will delight you—the ostrich ferns, the dainty maidenhair, the walking-leaf, with its curious habit of reaching out and rooting itself, and the cliff brake. People have been very thoughtless about digging up these plants and carrying them away, but now that the area has been made a state park they will of course be left there for all of us to enjoy. There are scores of different kinds of flowers and trees, and the whole place is cool, dark, and shady on hot summer days. On an island is a rock called Steamboat Rock. Just beyond this is Boneyard Hollow. This does not seem a very appropriate name for a beautiful place. The name comes from the wagonloads of buffalo bones found there by the early settlers. Many Indian arrowheads and axes have also been found. It is said that the Indians used this ravine as a trap for the buffalo. Perhaps when you see it you can understand this. The citizens of this part of the state contributed \$10,000 toward its purchase, and the state

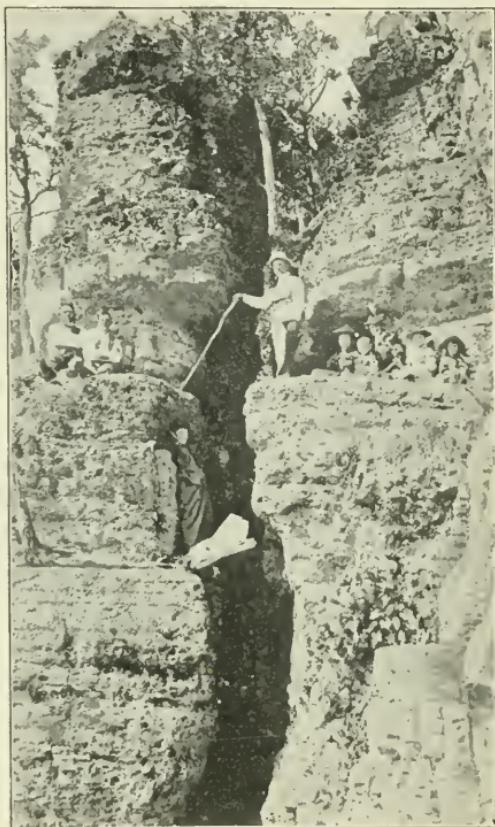


FIG. 96. You will enjoy exploring "The Stairway" at the Devil's Backbone, the State Park in Delaware County. A joint or vertical crack in the limestone has been weathered or worn out by the frost, wind, and rain until it is the size and shape you see here

paid the remainder of the \$38,000 which it cost. Why should any part of the state wish to have a state park in its neighborhood?

Half a mile south of Farmington, in Van Buren County, is another of the state parks. The local citizens bought and presented this park to the state of Iowa. In the park is a lake which is two thirds covered by a gorgeous field of lotus. Nowhere else in the state is there so large a bed of these beautiful creamy-white flowers. It is thought this species may have been planted here by the Indians, who used the tubers for food. The place is also interesting because it was settled in the very early days of Iowa's history. Farmington was one of the first places to be reached by a steamboat on the Des Moines River.

Van Buren County has another state park near Keosauqua. This is a large park extending from the town, along the south bank of the Des Moines River, about two miles upstream. It is hoped that many species of native wild animals may find a refuge there. The farmers in the neighborhood have promised to protect the wild life. In this park you will find the ruffed grouse and the quail, and the cardinal (seldom seen in the northern part of the state). The river may be crossed here at Ely's ford, which was a famous crossing place before the days of the railroad. Most of the trees are second growth, but a few primeval trees may be found in these woods. What are primeval trees? What are second-growth trees? How can you tell one from the other?

There is a tiny state park in Hardin County, three miles north of Union. This is known as Lepley Park. What highway runs close to the place (see pages 116 and 117)? This park is said to have in it nearly every tree which is native to Iowa. How many trees can you recognize and name? Near Oakland, in Pottawattamie County, a local Chautauqua association has given a small park to the state on condition that the state will add to it. This is a roadside park of great beauty. In Henry County, near Oakland Mills on the Skunk River, is another small park. Roosevelt Park in Floyd County, three miles north of Greene, has been presented to the state by an individual.

Look at the picture (Fig. 97) of Wild Cat Den, in Muscatine County, eight miles northeast of Muscatine. These sixty acres were given to the state by two sisters. The state and the local citizens will buy three hundred additional acres, thus making another large and beautiful park. The little creek is called Pine Creek. Classes from The University of Chicago and the University of Iowa come here to study botany. Perhaps some of you can study a little botany in this park. In the glen there are some white-pine trees a hundred and fifty years old. How many needles are there in a bunch on the white pine? Its scientific name is *pinus strobus*.

These are the parks which have been organized, according to the report published by the State Board. Now that the people have become interested in the conservation of Iowa's beauty spots, the State Board of Conservation is being overwhelmed by requests to establish additional parks. Many of these places have been examined, and no doubt some of them will be made into parks very soon.

The northeastern part of the state has been called the "Switzerland of Iowa." Switzerland has been called the "playground of Europe," so a part of this region might well be made the playground of Iowa. We have already said that this is the part of the state which first rose out of the ocean and that

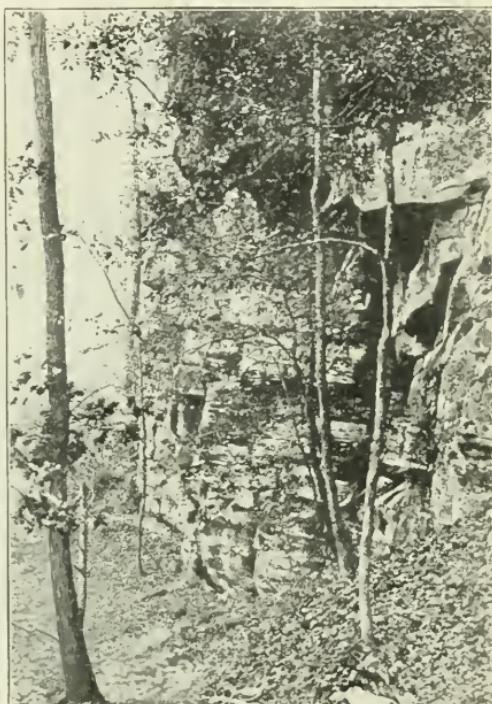


FIG. 97. This cliff of sandstone is in Wild Cat Den, one of the state parks. Where is this park? Can you see the layers or strata in the rock? What do they tell you of the place where this rock was formed?

the edge of the ice which came in here was thin and made little change in the surface; so you can see that weather and the rivers have had long ages to carve it into fantastic and wonderful shapes.

There are so many charming spots in this area that it will be hard to choose among them, but surely one on which we



FIG. 98. You are looking north from the City Park at Decorah upon one of Iowa's beauty spots. The river is the Upper Iowa. Which way does it flow?

shall all agree is that section around Decorah (Fig. 98). In this region is a wonderful ice cave. Mr. Lees, the Assistant State Geologist, says of this cave:

This is a great gap left in the rock by the slipping out of a block of stone along the cliff face. The limestones of the region are honeycombed with fissures and into these the cold air of winter is drawn, to be forced out during the warm days of spring and summer. This, coming into contact with the moisture-laden warm air of the cave, causes the precipitation of the moisture along the inner walls of the cave. This forms during the early summer months a coating of ice which sometimes becomes ten or twelve inches thick.

What is meant by precipitation? The cold air of winter works into the cracks far back of the cave and does not work out to the cave again for months.

The Upper Iowa or Oneota River is so beautiful that you will want to follow it for miles. There used to be famous trout fishing in this river. Why must we now content ourselves with simply looking at the trout? It is hard to decide which is the more beautiful season here—summer with its quiet greens or autumn with its brilliant colors. This is an ideal place for a camping week.

One other very attractive part of this driftless section of northeastern Iowa you should see. That is the country around McGregor, which so many people wish to have made a portion of a national park. See the beautiful picture, Fig. 99. The Pictured Rocks will interest you especially. These are part of a great cliff of very crumbly sandstone, stained in reds, yellows, browns, and even purples by the iron in the rock. In some places the sandstone is pure, glistening white. Would this rock be useful for building purposes? As you wander about you will find little nooks and grottoes filled with beautiful shrubs and ferns. Looking across the river to the Wisconsin side you can see the mouth of the Wisconsin River. What noted men were connected with the early history of this region?



FIG. 99. The "Pictured Rocks" near McGregor form cliffs, grottoes, and nooks of marvelous colors and patterns, set off by groves and lanes of shady trees

We cannot name all the attractive places in the state, but we must not omit the lakes. On what drift sheet did we find most of the Iowa lakes? Look at Fig. 11 to make sure. Where the edge of the sheet stood for a long time it often dropped much material very irregularly and left many hollows. This is what happened near the east side of the Wisconsin



FIG. 100. This is the site of the proposed national park near McGregor. The proposed park includes land on both sides of the Mississippi River. When you are looking across from the Iowa shore what state are you facing? Can you find out where some of our national parks are situated?

drift sheet, and here we find Clear Lake. You may judge from the picture (Fig. 101) that this is the finest sort of place to spend a fortnight's vacation, for it offers fine fishing, bathing, and boating. Spirit Lake and Okoboji Lake on the moraine near the west side of the Wisconsin drift are so beautiful that people from as far south as St. Louis have built summer cottages there. Is the region around these lakes cooler than St. Louis? There are people who are anxious to drain many of our small lakes in order to increase the amount of farm land.

Which do you think is the greater need of the people of rich Iowa, more places for happy holidays or more farm land?

In March, 1857, a terrible massacre occurred in the small colony which had settled near Pillsbury's Point on West Okoboji. A band of Sioux Indians attacked the little group of pioneers, who were too far away from other settlements to



FIG. 101. Clear Lake is another of the places suggested for a state park. It is a very pretty glacial lake which differs from other Iowa lakes in having no surface streams draining into it. Probably the water which falls on the hills to the north and to the south of it creeps along layers of sand and gravel to the lake bed

receive help, and destroyed the homes and killed whole families. As you wander about the lake shores you will find the Gardner home, where you can learn more about this.

In Marion County is a sandstone ledge stained in all shades from tan to a brilliant red. This was the work of the iron oxides. The Des Moines River has cut through this ledge, making bluffs from sixty to eighty feet in height. On the ridges are structures of the prehistoric mound-builders, and, scattered through the region, trees of the primeval forest still exist. There is a high cliff in this locality known as Red Rock. Many people are asking to have this area made into a park.

After reading about Iowa's beautiful scenery you are now ready to answer the question asked at the beginning of this section about the schoolboy who wrote, "Tell me something about Florida; there is nothing interesting to write about Iowa."

Try to visit as many of the places we have just described as you possibly can. If you are observing, you can learn a great deal more from such a trip than from merely reading a description in a book.

And Nature, the old nurse, took
The child upon her knee,
Saying, "Here is a story-book
Thy Father has written for thee."

CHAPTER XI

FACTS AND FIGURES

NOTE. The information given in the following pages is not intended for ordinary class study, but it seems desirable that in a textbook of this type there should be available for ready reference the salient facts relating to where our people live and what they do. A part of this material may properly serve as a basis for project work in connection with the study of local activities. This little book has stressed the fact that Iowa is first of all a great agricultural state, and it is to be expected that its manufactures will be very largely those of related industries. Of these only a few of the more important are mentioned, in connection with the larger towns and cities. The teacher desiring fuller information should consult local commercial bodies and the state reports, such as the Iowa Manufacturers' Directory.

LEADING INDUSTRIES OF IOWA

1. Meat-packing	\$221,692,000
2. Food preparations	80,583,000
3. Butter and cheese	49,201,000
4. Foundry and machine shop	40,632,000
5. Poultry and produce-packing	33,425,000
6. Printing and publishing	22,529,000
7. Mill work, planing	20,484,000
8. Agricultural implements	19,352,000
9. Flour and grist mills	17,405,000
10. Bakery products	13,449,000
11. Electric light, heat, power	11,904,000
12. Confectionery: candy, ice cream	11,612,000
13. Washing machines	8,930,000
14. Canning and preserving	8,599,000
15. Brick and tile	7,852,000

The graph on page 25 will indicate to the pupil the overwhelming importance of the agricultural industry in Iowa. The tables reproduced from the Iowa Year Book of Agriculture, entitled "Iowa's Source of Wealth," bring this point out clearly.

Although Iowa is primarily agricultural, yet it has many manufactures, and in recent years there has been great growth

in this direction. It is interesting to note how the chief manufactured products of the state are divided. The table on the preceding page shows this division for fifteen of the leading industries for the year ending December 31, 1919. While these figures will vary somewhat from year to year, yet they are sufficiently stable to serve as a basis of study.

There are many other industries of very considerable note. Thus, Iowa is the second state in the manufacture of pearl buttons, having now an annual output of about \$4,800,000. One of the largest, if not the largest, broom factories in the United States is at Burlington. The same is true of its furniture factory. The greatest cream separator factory in the United States is at Waterloo. The largest cereal mill in the United States is at Cedar Rapids. There probably are not elsewhere in the United States many equals of the sash-and-door factory at Dubuque. Automobile tires and tubes, cement products, clothing, patent medicines, furniture, stock and poultry remedies, wall plaster, and so forth total into the millions. Food products and all sorts of machinery used on the farm are large factors.

THE DISTRIBUTION OF FACTORIES

Unlike many states, the factories of Iowa are not confined to two or three of the larger cities. The larger factories are well distributed throughout the state, and practically all towns have some industries worth while. There are ten counties which in 1920 had a total production of over \$500,000,000 worth of manufactured goods. Woodbury leads all the counties in value of manufactured products, totaling over \$145,000,000, because of its great slaughtering and packing industry. Linn County comes next with nearly \$97,000,000, of which cereal products are an important part. Polk County is third on the list, with a great variety of industries, in which the printing and publishing item—including the output of the farm journals—stands out noticeably. In nearly all cases there is considerable diversity covering many small industries, although

often some one industry may particularly lead. Thus, in Scott County, where there are many industries, the foundry production is relatively important. Black Hawk County is noted for the production of various forms of dairy machinery and for the variety and value of its output of engines, tractors, and farm machinery. In Wapello County one's attention is called to the value of its slaughtering and packing industry. In Cerro Gordo County cement, brick, and tile stand out prominently; in Clinton County food products and dressed lumber; in Dubuque County sash-and-door and foundry products; in Webster County gypsum and plaster; in Lee County mill and machine work; in Marshall County vehicles and food preparations; in Muscatine County the pearl-button industry (a recent state report shows twenty-four different companies engaged in this business in the city of Muscatine alone). There are a number of the most important products, however—such as creamery products, canned goods, bakery products, confectionery, etc.—in which the distribution is so general that it is rather misleading to attempt to localize.

The outstanding facts are that Iowa has no great manufacturing centers but has a diversity of lesser industries well distributed throughout its entire area, and that these industries are very largely those that are closely related to the one great basic industry, agriculture. It means much for the health and happiness of the people of Iowa that these conditions prevail.

SOME THINGS THE PEOPLE IN OUR TOWNS MAKE

The following list, limited to the places of over five thousand population, mentions a few of the leading industries in each. Complete information can be obtained from the State Directory of Manufacturing Establishments:

Ames: Garden tools; canned goods; bakery products; creamery products; novelties.

Atlantic: Brick and tile; canned goods; packing of poultry and eggs; creamery products; building novelties.

Boone : Brick and tile; creamery products; foundry work; gloves and hosiery; saddlery.

Burlington : Furniture; brooms; printing and binding; bakery products; boxes and baskets; boats and engines; iron products; mill work; desks; machinery.

Cedar Falls : Steel farm gates; canned goods; creamery products; hardware specialties; clothing.

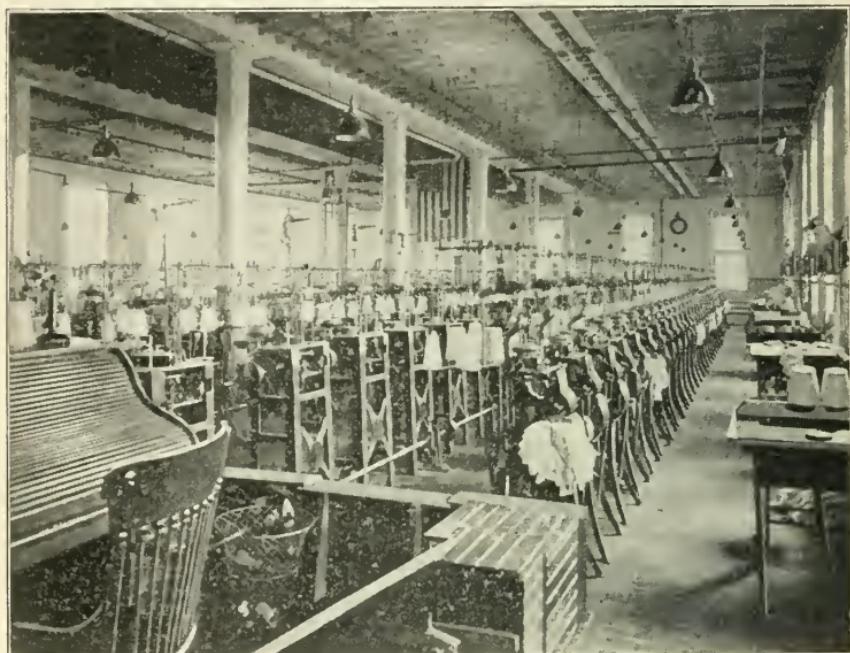


FIG. 102. The machines you see in this picture are seamless knitting machines in a hosiery mill in Des Moines. Can you give reasons why a hosiery factory should be located in Iowa?

Cedar Rapids : Cereal foods; corn sirup; leather and tanning; sheet-iron work; planing-mill work; pumps; tractors; slaughtering and packing; structural iron work; printing and binding.

Centerville : Brick; granite and marble products; bakery products; machine work.

Chariton : Saddlery; brooms; farm machinery; wagons.

Charles City : Tanks; gas engines; office fixtures; mill work; creamery products.

Clinton : Corn products; wire products; furniture; engines; bridge and structural iron work; lumber; mill work; hardware

specialties; sheet-iron products; sugar refining; garments; button blanks.

Council Bluffs: Cold storage; agricultural implements; playground appliances; tents and awnings; elevators and scales; stock foods and remedies.

Creston: Poultry-packing; brick and tile; planing-mill products; concrete blocks.

Davenport: Locomotives; silos; pumps; washing machines; brick and tile; ladders; steel wagons; foundry products; bakery products; printing and binding; planing-mill products; saddlery; garments.

Des Moines: Printing and binding; lithographing; automobile tires; structural iron work; medicines; furnaces; brick and tile; concrete machinery; hosiery and gloves; silos; chemical preparations; furniture; meat-packing; threshers and tractors; canned goods; farm equipment.

Dubuque: Sash and doors; milling machines; stove repairs; shoes; canvas goods; plumbing goods; lime; saddlery; caskets; sheet-metal products; boilers and tanks; pork-packing; lumber products.

Fairfield: Cement blocks; engines; gloves; rugs and carpets; barn equipment.

Fort Dodge: Gypsum; plaster; brick and tile; meat-packing; ditching machines; patent medicines; shoes; creamery products.

Fort Madison: Farm tools; car repairs; strawboard; button blanks; dental specialties; bakery and creamery products; canning.

Grinnell: Gloves; vehicles; tools; canning; brick and tile; washing machines.

Iowa City: Chemical products; jewelry; canning; foundry products; rubber goods; stock foods and remedies; brooms.

Keokuk: Electric power; cement machinery; hardware specialties; kitchen cabinets; button blanks; men's clothing; shoes; corn products; trucks and tires; silos and mill work; canvas products; brick and tile.

Le Mars: Stock remedies; creamery products; well machinery; cement products; bakery products.

Marshalltown: Machine work; foundry products; metal specialties; vehicles; creamery products; brick and tile; food preparations; tools.

Mason City : Brick and tile ; cement ; packing of meat and poultry ; machine work ; beet sugar ; mill work ; structural iron work.

Muscatine : Pearl buttons ; button machinery ; garments ; lumber-mill work ; boilers and sheet-iron work ; canning machinery ; bakery products ; canned goods.

Newton : Washing machines ; gas plants ; foundry and machine work ; advertising novelties ; ditching machinery ; agricultural machinery ; office fixtures.

Oelwein : Car repairs ; creamery products ; cooking utensils ; sash, doors, and mill work ; bakery products.



FIG. 103. The Sioux City stockyards cover a large area. Why is Sioux City such an important meat-packing center?

Oskaloosa : Men's clothing ; silos and tanks ; canned goods ; heaters and furnaces ; paving brick ; bakery products ; cement products.

Ottumwa : Mining appliances ; meat-packing ; vehicles ; farm machinery ; dairy products ; brick and tile ; boilers and tanks ; gasoline engines ; steel bridges ; cold storage ; hardware specialties.

Perry : Washing machines ; lumber-mill work ; condensed milk ; cement products.

Red Oak : Calendars ; canning ; dairy products ; iron work.

Shenandoah : Stock remedies ; brick and tile ; gloves ; corn huskers.

Sioux City : Slaughtering and meat-packing ; soap ; leather goods and tanning ; electrical appliances ; tents and awnings ; foundry work ; furnaces ; engines ; wire and iron products ; woodwork ; newspaper plates ; clothing ; bakery products ; farm specialties ; flour and feed.

Waterloo: Cream separators; dairy machinery; gasoline engines; farm implements; gas machines; tractors; packing of meat and poultry; flour; bakery products; saddlery; concrete machinery; skirts and garments; motor trucks; cooking utensils; pottery novelties.

Webster City: Sheet-iron products; sewer pipes; shoes; brick and tile; creamery products.

IOWA PRIMARILY AGRICULTURAL

Following is a tabulated crop summary for the year ending December 31, 1919, and a table showing the number, average value, and total value of the live stock for the same year. These two tables reveal the chief sources of the wealth of the state. Iowa produces about one tenth of the total supply of food derived from grain and animals in the United States.

IOWA'S SOURCE OF WEALTH, DECEMBER 31, 1919

Compiled for the Iowa Year Book of Agriculture from estimates furnished by the Iowa Coöperative Crop-Reporting Service

CROP	ACRES	AVERAGE YIELD	AVERAGE PRICE	TOTAL YIELD	TOTAL VALUE
Corn	10,000,000	41.6 bu.	\$1.17	416,622,000	\$487,447,740
Oats	5,670,000	34.6 bu.	.64	196,391,500	125,690,560
Spring wheat	750,000	9.5 bu.	1.89	7,145,300	13,504,617
Winter wheat	950,000	17.4 bu.	1.98	16,508,600	32,687,028
Barley	315,000	25.5 bu.	1.11	8,022,800	8,905,308
Rye	70,000	15.9 bu.	1.33	1,110,050	1,476,366
Flaxseed	16,000	9.5 bu.	3.90	152,275	593,872
Timothy seed	200,000	4.5 bu.	4.91	900,000	4,419,000
Clover seed	60,000	1.4 bu.	24.92	84,000	2,093,280
Potatoes	115,000	43.0 bu.	1.94	4,942,110	9,587,693
Hay (tame)	2,992,000	1.6 tons	18.37	49,573,370	91,066,887
Hay (wild)	478,000	1.3 tons	16.48	631,693	10,410,301
Alfalfa	148,000	3.2 tons	23.09	477,314	11,021,180
Pasturage and grazing (estimated)					100,000,000
Ensilage (estimated)					20,000,000
Sweet corn (commercial crop)	40,000	3.0 tons	13.50	120,000	1,620,000
Pop corn (estimated)	29,300	24.9 bu.	3.79	729,570	2,765,070

IOWA'S SOURCE OF WEALTH (*Continued*)

CROP	ACRES	AVERAGE YIELD	AVERAGE PRICE	TOTAL YIELD	TOTAL VALUE
Buckwheat (estimated)	7,000	14.0 bu.	1.95	98,000	\$191,100
Fruit crop (estimated)					7,000,000
Garden truck (estimated)					8,000,000
Sugar beets for manufacture (estimated) .	8,000	8.0 tons	9.00	64,000	576,000
Miscellaneous (estimated)					11,000,000
Total					\$950,056,002
Dairy products (estimated)					113,000,000
Poultry and eggs (estimated)					85,000,000
Wool, 4,500,000 at 55¢					2,475,000
Total value of farm products					\$1,150,531,002

NUMBER, AVERAGE VALUE AND TOTAL VALUE OF LIVE STOCK, DECEMBER 31, 1919

Figures taken from estimates made by the United States Department of Agriculture

	NUMBER	AVERAGE VALUE	TOTAL VALUE
Horses	1,505,000	\$89.00	\$133,945,000
Mules	71,000	121.00	8,591,000
Milch cows	1,363,000	88.00	119,944,000
Other cattle	2,775,000	49.00	135,975,000
Swine	10,389,000	21.80	226,480,200
Sheep	1,321,000	12.00	15,852,000
Total value of live stock			\$640,787,200
Total value of farm products and live stock			\$1,791,318,202

In connection with the horse figures in this table it is interesting to note that, according to the Iowa Year Book, Iowa exported more horses during the World War than any other state, and that it has more Percheron horses than France, more Clydesdales than Scotland, more Shires than England, and more Belgian horses than Belgium.

The aggregate farm values of the state of Iowa are greater than the total farm values of these nineteen states: Maine, New Hampshire, Vermont, Connecticut, Massachusetts, Rhode Island, Delaware, New Jersey, Maryland, West Virginia, South Carolina, Florida, Alabama, New Mexico, Utah, Arizona, Nevada, Wyoming, and Montana.

The annual corn crop of Iowa exceeds in value the total annual gold output of the United States. Even the egg crop of Iowa is more valuable than the total orange crop of California.

TYPES AND BREEDS OF ANIMALS

It is plain that the live-stock industry is of such overwhelming importance in Iowa that it pays for stock-raisers to produce the best of types and breeds. It is a good sign that in so many communities the boys and girls are active in live-stock clubs. It is an interesting and profitable study to learn of the qualities of various breeds of animals and why certain types and breeds are preferred. Your study will lead you to discover that animals vary almost as much as human beings in their attributes, and that many factors must be kept in mind in determining what animals are most profitable to raise under given conditions.

HOGS

You have already learned how important an element in the wealth of Iowa is the hog. Attention has been called in the text to the general types—the lard hog and the bacon hog. You will have learned why the former type is more common in Iowa. The lard hog is broad of back, has large hams, short legs, fattens rapidly, and matures early. It is called the lard type because of the abundance of fat. Hogs of this type are relatively quiet and docile. Some of the more common breeds are the Poland China, the Duroc-Jersey, the Berkshire, the Chester White, and the Hampshire. The Mule-Foot hog, so called because the hoof is not split, is an interesting breed of the lard type. It is claimed by some that this breed is remarkably free from cholera.

The bacon type of hog lacks the broad back of the lard hog. It has longer sides, smaller hams, and does not grow so large. In general this type is longer and leaner and more active than the lard type. Bacon hogs grown under corn-belt conditions gradually change their characteristics. In Iowa more attention



FIG. 104. Prize winners of three breeds of cattle in the Boys' and Girls' Baby-Beef Contest of 1920. What breeds are these? The education of the boys and girls of Iowa is not limited to the schoolroom

than formerly is given to their breeding, as there is an increasing demand for the best bacon. The Large Yorkshire and the Tamworth are popular breeds of this type.

CATTLE

In a region so rich in corn and grass, cattle-raising is naturally a leading industry. There are two general types of cattle: beef and dairy. Among the most common of beef types are the Shorthorn, Hereford, Aberdeen-Angus, Galloway, Polled Durham, and Polled Shorthorn. Of the dairy type the Guernsey, the Jersey, and the Holstein are most numerous.

HORSES

The raising of draft horses has long been a large industry in Iowa. Weight is an essential factor in determining the relative value of draft horses. Buyers often ship carload lots of Iowa horses to points nearer the Eastern markets, where the horses are scientifically fed with a view of bringing them to maximum weight.

Among the most popular breeds are the Percheron, whose home is France; the Clydesdale, from Scotland; the Belgian, from Belgium; and the Shire, from England.

SHEEP

It was explained earlier in the text that Iowa is not of prime importance as a sheep-raising state. The leading sheep-raising states ranked in the following order in a recent year: Wyoming, Montana, New Mexico, Idaho, Ohio, California, and Oregon.

There are two types of sheep: the wool type and the mutton type. There are two types of the latter: the long-wooled and the medium-wooled. One of the chief breeds, noted for the fineness of the wool, is the Merino. Some of the most common breeds of the mutton type are the Shropshire, Southdown, Suffolk, Cotswold, Lincoln, and Hampshire Down.

Your school library probably contains Plumb's "Types and Breeds of Farm Animals," or similar books. Consult these and learn for yourself how breeds differ. Various breeds have distinctive qualities that lead to their selection by the breeder (Fig. 104). There is no more interesting or more profitable study for the boys and girls of Iowa than these great sources of wealth.

COAL

Attention has been called in the text to the distribution of this mineral. While there are factors that cause the production to vary somewhat from year to year, yet the table on the following page, showing the production in one year, is to be taken as a safe guide to the study of this subject.

IOWA COAL STATISTICS FOR 1919

COUNTY	NUMBER OF MINES	TOTAL PRODUCTION IN TONS	EMPLOYEES
Monroe	22	1,723,438	3,195
Appanoose	69	1,009,895	3,247
Polk	20	897,121	1,866
Marion	21	539,198	1,288
Dallas	5	354,573	800
Lucas	6	398,859	680
Boone	6	146,689	461
Wapello	20	165,221	378
Jasper	6	138,590	350
Mahaska	18	75,418	181
Warren	2	70,384	148
Wayne	3	10,663	54
Keokuk	4	7,185	20
Adams	6	6,464	74
Taylor	4	7,490	42
Page	2	7,032	38
Van Buren	6	6,413	24
Greene	3	4,976	20
Guthrie	2	2,021	20
Totals	225	5,571,630	12,886

OTHER MINERALS

Although coal constitutes the chief mineral wealth of Iowa, there are some other minerals well worth while—such as cement, gypsum, clay, stone, lime, etc.

In 1920 the shipments of Portland cement from Iowa factories totaled about \$8,676,000 in value.

The value of the gypsum products for the same period was \$2,403,012—exceeded only by New York.

The latest available figures show the value of the annual output of clay products to be about \$7,000,000. More than \$2,000,000 worth of drain tile is manufactured annually in Iowa.

The annual value of the sand and gravel production in Iowa for the same period was \$1,383,764. The stone and lime production was a much smaller item, the total value being only about \$600,000.

A FEW FACTS WORTH REMEMBERING

1. The population of Iowa in 1920 was 2,404,021.
2. Less than half the people of Iowa live in towns and cities.
3. The school enrollment in Iowa in 1920 was 547,272.
4. Iowa has the highest percentage of literacy of any state in the Union.
5. Iowa has an area of 56,147 square miles.
6. The highest altitude in Iowa is 1670 feet, at Ocheyedan Mound, Osceola County.
7. The elevation of Des Moines is about 800 feet.
8. Iowa ranks first among the states in the percentage of improved land.
9. Iowa is in the center of the corn belt and is about midway between the Atlantic and Pacific oceans.
10. The average annual rainfall in Iowa is 31.5 inches.
11. In July, 1856, Iowa had only 67 miles of railroad.
12. Iowa now has 14,247 miles of railway, including 338 miles of electric lines, and ranks fourth among the states in total railway mileage.
13. In a recent year the railroads paid the state of Iowa in taxes \$4,790,864.
14. The first territorial legislature of Iowa met in Burlington in 1838.
15. Iowa City was the capital of Iowa from 1839 to 1857.
16. Des Moines became the capital of Iowa in 1857.
17. The State University of Iowa was established at Iowa City in 1847.
18. Armistice Day (November 11) was made a legal holiday in Iowa in 1921.

INCORPORATED PLACES IN IOWA HAVING A POPULATION
OF 1000 OR OVER—CENSUS OF 1920

Ackley	1,529	Colfax	2,504
Adel	1,455	Coon Rapids	1,328
Akron	1,324	Corning	1,840
Albia	5,067	Correctionville	1,016
Algona	3,724	Corydon	1,867
Alta	1,290	Council Bluffs	36,162
Alton	1,007	Cresco	3,195
Ames	6,270	Creston	8,034
Anamosa	2,881	Davenport	56,727
Anita	1,236	Decorah	4,039
Atlantic	5,320	Denison	3,581
Audubon	2,108	Des Moines	126,468
Avoca	1,482	Dewart	1,849
Bedford	2,073	Dows	1,145
Belle Plaine	3,887	Dubuque	39,141
Bellevue	1,663	Dunlap	1,455
Belmond	1,797	Dyersville	1,933
Bettendorf	2,178	Eagle Grove	4,433
Bloomfield	2,064	Eldon	2,091
Boone	12,451	Eldora	3,189
Brighton	1,014	Elkader	1,223
Britt	1,619	Emmetsburg	2,762
Brooklyn	1,533	Estherville	4,699
Burlington	24,057	Fairfield	5,948
Calmar	1,039	Farmington	1,086
Carroll	4,254	Fayette	1,085
Cascade	1,249	Fonda	1,136
Cedar Falls	6,316	Forest City	2,145
Cedar Rapids	45,566	Fort Des Moines	1,020
Centerville	8,486	Fort Dodge	19,347
Chariton	5,175	Fort Madison	12,066
Charles City	7,350	Garner	1,311
Cherokee	5,824	Glenwood	3,862
Cincinnati	1,301	Grand Junction	1,010
Clarinda	4,511	Greene	1,375
Clarion	2,826	Greenfield	1,707
Clarksville	1,003	Grinnell	5,362
Clear Lake	2,804	Griswold	1,264
Clinton	24,151	Grundy Center	1,749

Guthrie Center	1,727	Marengo	2,048
Guttenberg	1,666	Marion	4,138
Hamburg	2,017	Marshalltown	15,731
Hampton	2,992	Mason City	20,065
Harlan	2,831	Melcher	1,582
Hartley	1,306	Missouri Valley	3,985
Hawarden	2,491	Monona	1,049
Holstein	1,248	Montezuma	1,273
Humboldt	2,232	Monticello	2,257
Humeston	1,214	Moulton	1,387
Ida Grove	2,020	Mount Ayr	1,738
Independence	3,672	Mount Pleasant	3,987
Indianola	3,628	Mount Vernon	1,466
Iowa City	11,267	Muscatine	16,068
Iowa Falls	3,954	Mystic	2,796
Jefferson	3,416	Nashua	1,317
Jewell	1,090	Nevada	2,668
Keokuk	14,423	New Hampton	2,539
Keota	1,025	New London	1,144
Kingsley	1,072	New Sharon	1,084
Knoxville	3,523	Newton	6,627
Lake City	2,110	Nora Springs	1,055
Lake Mills	1,529	Northwood	1,597
Lamoni	1,787	Oakland	1,188
Larsing	1,447	Odebolt	1,445
Laporte City	1,443	Oelwein	7,455
Le Mars	4,683	Ogden	1,451
Lehigh	1,090	Onawa	2,256
Lenox	1,197	Orange City	1,632
Leon	2,193	Osage	2,878
Logan	1,637	Osceola	2,684
McGregor	1,289	Oskaloosa	9,427
Madrid	1,783	Ottumwa	23,903
Malvern	1,195	Parkersburg	1,108
Manchester	3,111	Pella	3,338
Manilla	1,142	Perry	5,642
Manly	1,476	Pocahontas	1,302
Manning	1,863	Postville	1,039
Manson	1,409	Red Oak	5,578
Mapleton	1,367	Reinbeck	1,415
Maquoketa	3,626	Remsen	1,144
Marcus	1,091	Rockford	1,031

Rockingham	1,099	Tabor	1,186
Rock Rapids	2,172	Tama	2,601
Rock Valley	1,347	Tipton	2,142
Rockwell City	2,039	Toledo	1,604
Rolfe	1,031	Traer	1,329
Sac City	2,630	Valley Junction	3,631
Sanborn	1,497	Villisca	2,111
Seymour	1,746	Vinton	3,381
Sheffield	1,106	Walnut	1,072
Sheldon	3,488	Wapello	1,480
Shenandoah	5,255	Washington	4,697
Sibley	1,803	Waterloo	36,230
Sidney	1,154	Waukon	2,359
Sigourney	2,210	Waverly	3,352
Sioux Center	1,389	Webster City	5,657
Sioux City	71,227	West Burlington	1,212
Sioux Rapids	1,080	West Liberty	1,834
Spencer	4,599	West Union	1,777
Spirit Lake	1,701	What Cheer	1,626
Storm Lake	3,658	Williamsburg	1,251
Story City	1,591	Wilton	1,178
Strawberry Point	1,101	Winfield	1,027
Stuart	1,716	Winterset	2,906
Sumner	1,511	Woodbine	1,463

POPULATION OF COUNTIES IN IOWA—CENSUS OF 1920

Adair	14,259	Cedar	17,560
Adams	10,521	Cerro Gordo	34,675
Allamakee	17,285	Cherokee	17,760
Appanoose	30,535	Chickasaw	15,431
Audubon	12,520	Clarke	10,506
Benton	24,080	Clay	15,660
Black Hawk	56,570	Clayton	25,032
Boone	29,892	Clinton	43,371
Bremer	16,728	Crawford	20,614
Buchanan	19,890	Dallas	25,120
Buena Vista	18,556	Davis	12,574
Butler	17,845	Decatur	16,566
Calhoun	17,783	Delaware	18,183
Carroll	21,549	Des Moines	35,520
Cass	19,421	Dickinson	10,241

Dubuque	58,262	Mitchell	13,921
Emmet	12,627	Monona	17,125
Fayette	29,251	Monroe	23,467
Floyd	18,860	Montgomery	17,048
Franklin	15,807	Muscatine	20,042
Fremont	15,447	O'Brien	19,051
Greene	16,467	Osceola	10,223
Grundy	14,420	Page	24,137
Cuthrie	17,596	Palo Alto	15,486
Hamilton	19,531	Plymouth	23,584
Hancock	14,723	Pocahontas	15,602
Hardin	23,337	Polk	154,029
Harrison	24,488	Pottawattamie	61,550
Henry	18,298	Poweshiek	19,910
Howard	13,705	Ringgold	12,919
Humboldt	12,951	Sac	17,500
Ida	11,689	Scott	73,952
Iowa	18,600	Shelby	16,065
Jackson	19,931	Sioux	26,458
Jasper	27,855	Story	26,185
Jefferson	16,440	Tama	21,861
Johnson	26,462	Taylor	15,514
Jones	18,607	Union	17,268
Keokuk	20,983	Van Buren	14,060
Kossuth	25,082	Wapello	37,937
Lee	39,676	Warren	18,047
Linn	74,004	Washington	20,421
Louisa	12,179	Wayne	15,378
Lucas	15,686	Webster	37,611
Lyon	15,431	Winnebago	13,489
Madison	15,020	Winneshiek	22,091
Mahaska	26,270	Woodbury	92,171
Marion	24,957	Worth	11,630
Marshall	32,630	Wright	20,348
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